HELSINKI SCHOOL OF ECONOMICS (HSE)
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CREDIT RATING AGENCIES AND CREDIT RATINGS – PIERCING THE FOG OF ASYMMETRIC INFORMATION OR NOT?

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ABSTRACT
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CREDIT RATING AGENCIES AND CREDIT RATINGS – PIERCING THE FOG OF ASYMMETRIC INFORMATION OR NOT?

Objectives of the study
The objective of the study is to find out the impact of a credit rating change announcement to company's stock price performance in the leading European markets between 1990 and 2007. An answer to the research question is provided by analysing multiple different hypotheses. In addition to overall analysis, the reader is provided with country, issuer, and rating agency -specific results.

Data and methodology
The data consists of long-term issue-specific credit rating changes, which are gathered from the Reuters –database. The impact of the credit rating change is analysed by measuring company's daily stock price performance, obtained from the DataStream. The methodology of this study includes cumulative abnormal returns (CAR), multiple regressions, Student's *t*-tests, and Wilcoxon sign rank tests.

Results
The impact of upgrading or downgrading the credit rating appears to be asymmetric, concerning their abnormal stock price performance. Downgrading the credit rating seems to have a much larger and statistically more significant impact on companies' returns, compared to upgrading the credit rating. Despite some country-specific differences, the results appear to be highly similar in all of the markets on average. Moreover, there are no reliable differences concerning the impact of the rating change announcements of different rating agencies either. However, the impact of the credit rating change seems to be dependent on the industry of the issuer. Rating change announcements for banks induce large and highly significant stock market responses, while other companies do not encounter similar response.

Keywords
Credit rating agencies, Credit ratings, Cumulative abnormal return (CAR), Basel II, Internal ratings-based approach (IRB).

HELSINGIN KAUPPAKORKEAKOULU
Rahoituksen Pro Gragu -tutkielma
Lasse Sakari Kivikataja

TIIVISTELMÄ
2.6.2008

LUOTTOLUOKITUSLAITOKSET JA LUOTTOLUOKITUKSET – AUTTAVATKO SIJOITTAJIA EPÄSYMMETRISEN INFORMAATION ANALYSOIMISESSA?

Tutkimuksen tavoitteet
Tutkimuksen tavoitteena on selvittää luottoluokitusten muutosten vaikutusta yrityksen osakekurssikehitykseen Euroopan johtavilla markkinoilla vuosina 1990-2007. Tutkimuskysymykseen on pyritty vastaamaan käsittelemällä aihetta monen eri hypoteesin kannalta. Yleisen analyysin lisäksi vastauksia on pyritty antamaan tutkimalla erikseen maakohtaisten, liikkeellelaskijan, sekä luottoluokituslaitosten -analyysien tuloksia.

Tutkimusaineisto ja -menetelmät
Tutkimusaineiston havainnot koostuvat liikkeellelaskevan yrityksen pitkäaikaisten bondien luottoluokitusten muutoksista, jotka on kerätty Reuters –tietokannasta. Luottoluokitusten muutoksen vaikutusta tutkitaan yrityksen päivittäisen osakekurssikehityksen avulla, joka on kerätty DataStream –tietokannasta. Tutkimusmenetelminä on käytetty kumulatiivisia ylisuuria tuottoja (CAR), monimuuttujaregressioita, Studentin *t*-testejä, sekä Wilcoxonin sijalukujen merkkitestiä.

Tulokset
Luottoluokituksen korottamisen (Upgrade) ja laskemisen (Downgrade) vaikutukset yrityksen osakekurssikehitykseen näyttävät olevan keskenään epäsymmetrisiä. Luottoluokitusten laskemisilla näyttää olevan selvästi suurempi ja tilastollisesti merkittävämpi vaikutus, kuin vastaavilla luottoluokituksen korottamisilla. Joistakin maakohtaisista eroista huolimatta tulokset ovat keskimäärin hyvin samanlaisia kaikilla tutkimukseen liittyvillä markkinoilla. Eri luottoluokituslaitosten antamien luottoluokitusten muutosten vaikutusten välillä ei myöskään ole huomattavia eroja. Luottoluokituksen muutoksen vaikutus näyttää kuitenkin olevan riippuvainen bondin liikkeellelaskevan yrityksen toimi-alasta. Pankkien kohtaamat muutokset johtavat selvästi suurempiin ja tilastollisesti merkittävämpiin tuloksiin, muihin yrityksiin verrattuna.

Avainsanat
Luottoluokituslaitokset, luottoluokitukset, kumulatiivinen ylisuuri tuotto (CAR), Basel II, Internal ratings-based approach (IRB).

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1. INTRODUCTION

1.1 ACADEMIC AND PRACTICAL MOTIVATION

"But there is no doubt that one reason why ratings have become so useful is simply because they are there, and they make life simpler for their users."
- *The Economist*, May 15th, 1999.

Europe has long been ignored when concerning the effect of credit rating announcements. The literature is vast for US markets, but for some reason there are very few major studies analysing the phenomenon in Europe. In addition, European studies usually concentrate on some specific country or product, thus losing the possibility to draw conclusions on the European level as a whole. There are several reasons to believe that bond rating changes provide a meaningful and significant setting for assessing companies' stock returns. First, bond rating changes are public and well-disseminated information events. Second and more importantly, bond rating changes represent a change in a company's financial position or business environment which has a significant impact on the company's or its bond's creditworthiness (See Dichev and Piotroski, 2001).

After the recent sub prime[1] crisis and the following credit crunch as well as some infamous defaults in the past like Enron, WorldCom, and Parmalat, the existence of credit rating agencies and the contribution of credit ratings to capital markets have risen to discussion. Since credit ratings play such an important part in many investment decisions it is questionable, whether rating agencies and their ratings in fact provide useful, reliable and new information to the investors and markets. At least the supervisors and regulators seem to think this is the case, since the Bank for International Settlements clearly acts as an advocate when it comes to these agencies' credit ratings. The new Basel II accord further enhances the impact of credit ratings as banks are asked to provide their own internal credit rating assessments for their individual clients (See Basel Committee on Banking Supervision, 2001c).

[1] Beginning in late 2006, the U.S. sub prime mortgage industry entered what many observers have begun to refer to as a meltdown. A steep rise in the rate of sub prime mortgage foreclosures has caused more than 100 sub prime mortgage lenders to fail or file for bankruptcy so far. Sub prime mortgages are loans made to borrowers who are perceived to have high credit risk, often because they lack a strong credit history or have other characteristics that are associated with high probabilities of default.

Data on the long run provides evidence, that major rating agencies' default rates are inversely related to credit ratings (See Keenan 2000). However, the magnitude of default rates by grade seems to vary from year to year. This pattern of evidence is consistent with the view that public credit ratings are a classification device that is useful for relative ranking, but do not attempt to provide an accurate prediction of credit risk. A single default by a highly rated credit does not refute the usefulness of the whole rating system, since rating process is essentially a statistical process and thus, there will be some defaults in each rating grade. But transitions like these are inherent to create suspicion across investors and foster the negative image against slow and bureaucratic credit rating agencies. Despite a lack of clarity toward ratings and their usefulness, references to credit ratings provided by major credit rating agencies continues to grow as the new Basel II agreement indicates.

1.2 RESEARCH PROBLEM AND PURPOSE

The objective of the study is to test credit rating agencies and the impact of their credit rating actions by analysing companies' stock market performance during a credit rating change. In addition to sheer information content inherent to credit rating change, there are also other factors influencing excess stock returns, especially in the international context. Since all major credit rating agencies are from the US, it is somewhat unclear whether bond investors in Europe fully relate their investment decisions on ratings provided by US agencies. And moreover, whether US agencies possess adequate and up-to-date knowledge and market-awareness over all the European companies, some of them acting in a highly different market compared to the one in the US. Possible differences in the European markets include at least regulation, accounting standards, language and culture, as well as issuer specific factors. All of these factors hinder the process of assigning a credit rating, and thus make the work of agencies more difficult. To obtain more rigorous results, the information value of credit ratings is tested by using several different approaches. I am trying to answer to the actual research problem by investigating multiple different hypotheses, though slightly modified, also presented by Steiner and Heinke (2001) in their study.

Under the *information content hypothesis*, which is the main hypothesis of my study, I expect a significant stock price reaction on the announcement day of credit rating change. I expect rating upgrades to be associated with positive and rating downgrades with negative stock

price reactions on the announcement day. According to Efficient Market Hypothesis (See Fama 1970 and 1991) this price movement should be permanent, since there should be a new level of risk associated with the newly down- or upgraded bond. I will also analyse the magnitude of credit rating change, thus if the assessment of credit rating agencies is correct the change in stock price should be stronger the more notches the bond is down- or upgraded.

H0: A rating change announcement is preceded by stock price reaction, i.e. the markets are efficient.

Under the *nationality hypothesis* I expect the stock price reaction after the rating announcement to be independent of the nationality of the market. Since I only use publicly listed companies from seven major European markets, I expect that nationality does not affect the market efficiency. High market follow up as well as transparency and disclosure requirements of these public companies are believed to support similar attitudes among investors towards possible rating changes in all markets.

H1: The magnitude of price reaction is indifferent of country.

Under *reliability hypothesis* the excess stock returns should be independent of the announcement of a rating agency. If a rating agency encounters a moral hazard problem by systematically overrating some issuers in order to gain market share, this would lead to different post-announcement price reaction, according which agency has provided the rating. But since reputation and history are so crucial in credit rating business, I expect there is no reason to believe that there are reliability differences in European bond ratings between major credit rating agencies.

H2: The magnitude of price reaction is indifferent of rating agency.

Since regulation and scrutiny are even more rigorous for banks than for other companies, under the *issuer hypothesis*, I expect to receive statistically less significant price movements after rating change of a bank compared to a non-bank. Since banks are more closely monitored by regulators and other institutions, I hypothesize to find weaker market response after a credit rating change of a bank. On the other hand, I believe that a rating change encountered by less transparent company will lead to stronger stock price movement due to the company's less monitored nature.

H3: Price reaction is statistically more significant for companies with less market follow up.

1.3 LIMITATIONS OF THE STUDY

This study aims to answer the question, whether credit rating announcements provided by rating agencies are reliable and useful to investors, or if they are merely summarizing existing information already available in the markets. The main limitations in my study relate to the data collection process and the scope.

Although the data is quite vast and thus individual events are not expected to have such a clear-cut effect in the overall analysis, similarly to all event studies, coincide events might cause some noise in the study. Even though coincide events of different rating agency announcements occurring at the same time were excluded, there is a possibility of some other company-specific event occurring during the announcement of new credit rating, thus affecting the analysis.

According to the new Basel II accord, banks are expected to use internal credit ratings in the future to analyse the financial position of their borrowers and this requires considerable data collection, since statistical calculations behind internal ratings are based on bank's own historical data. The main variable behind calculations of internal credit ratings is probability of default (PD), which requires quite vast default data. Since I encountered only five defaults in my study, I was not able to provide the reader with an analysis of the possible internal ratings based approach with my data.

Another limitation relates to the reason behind an issue-specific credit rating change. If a credit rating change is a result of a comprehensive change in a certain industry or business, the information content behind a credit rating change is not related to company specific matters and thus, should be omitted from the sample consisting of issue-specific credit rating changes. Setting these kinds of restrictions to the data is very challenging, but at the same time these observations are believed to be highly improbable.

Some might argue that using only major US credit rating agencies restricts my study, but information of credit ratings provided by smaller, national credit rating agencies was not obtainable and the number of observations by these agencies would have in all likeliness remained too low. Another reason for using only major credit rating agencies was that they are considerably more recognised among investors, and I believe they are more likely to answer to the research question, whether rating agencies and their ratings in general provide investors with useful and new information.

1.4 STRUCTURE OF THE STUDY

The rest of the thesis is organised as follows. Chapter 2 provides a theoretical background for the study discussing Efficient Market Hypothesis (2.1), previous studies along with their findings (2.2), as well as Basel II and Internal ratings-based approach (2.3). The objective of this chapter is to familiarise the reader with the most important studies as well as their findings and provide theoretical background. The literature review continues in chapter 3, where I present the different credit ratings (3.1), credit rating agencies (3.2) and a standard credit rating process (3.3). Chapter 4 presents the data (4.1), descriptive statistics (4.2) and methodologies (4.3) used in this study. Analysis and results are explained in chapter 5 and chapter 6 provides the summary and conclusion. References are expressed after the summary and appendices conclude the study.

2. THEORETICAL BACKGROUND

2.1 EFFICIENT MARKET HYPOTHESIS

According to Efficient Market Hypothesis (EMH) at any point in time security prices "fully reflect" *all* available information. That is to say, it is not possible to consistently outperform the market by using any information that the market already knows, except trough luck (see Fama 1970). The earliest discussion of EMH started already in the early 1900, with Bachelier's model to test random walk. Even though his contributions were ignored for a long time, they served as a foundation for EMH discussion when it re-emerged in the 1950's and 1960's. The concept of EMH, however, was truly discovered when Fama published his paper in 1970 on efficient capital markets, defining three different levels of efficiency. These three levels of efficiency are; the weak form, semi-strong form and strong form.

2.1.1 Weak form

The weak form of Efficient Market Hypothesis states that all past information is included in security prices. Previous studies aiming to test the weak form of EMH have focused on return predictability by assessing time-series predictability (return autocorrelation, seasonality) or cross-sectional predictability (equilibrium asset pricing models like CAPM). One of the earliest studies testing the weak form of EMH is that of Kendall's (1953) extensive analysis on serial correlation of weekly changes in 19 indices of British industrial share prices. Fisher (1966) found in his study that positive autocorrelation was more important for small stock portfolios. Lo and MacKinlay (1988) and Conrad and Kaul (1988) also found out that returns are more predictable for small-stock portfolios. According to the study of French and Roll (1986), markets are more variable when the market is open.

2.1.2 Semi-strong form

The semi-strong form of EMH states that market prices also adjust efficiently to all other information that is publicly available. Tests for semi-strong form of EMH focus on how quickly prices reflect to public information and event study is mainly used as methodology.

Each individual test, however, is only concerned on one kind of information generating event (e.g. stock splits, security issues, or credit rating announcements) and therefore giving support for the overall validity of the model, if accepted. Fama, Fischer, Jensen and Roll (1969) conclude in their study that the stock market is efficient, at least with respect to its ability to adjust to the information of stock split. The available semi-strong form of evidence on the various public announcements on common stock returns appears to be consistent with the EMH. Moreover, the studies of Ball and Brown (1968) on annual earnings announcements as well as Scholes' (1969) study on new issues and large block secondary offerings of common stock also seem to support the semi-strong form of efficiency.

2.1.3 Strong form

The strong form of EMH states that private information or insider information are also quickly incorporated by market prices and thus all information, whether public or private is fully reflected in a security's current market price. Tests for strong form of EMH are concerned with investors possessing private information, like insider trading, security analysts, or fund managers, who have monopolistic access to any information relevant for price formation. Niederhoffer and Osbourne (1966) studied specialists on major stock exchanges and Scholes (1972) corporate insiders and they both reinforced that these insiders often have monopolistic access to information about their firms, providing evidence that the strong form of EMH is not entirely valid.

The results of previous studies conclude that both the weak form and the semi-strong form are supporting EMH, but there is some ambiguity concerning the strong form of EMH. The strong form of EMH can be seen as a benchmark against which deviations of market efficiency can be judged. Fama argues that, since event studies come closest to allowing a break between market efficiency and equilibrium-pricing issues, they give the most direct evidence on efficiency. If the EMH holds, the information about the event should be incorporated into the prices before or on the day of the event itself. Thus, there should be no impact on returns after the event.

2.2 PREVIOUS STUDIES AND FINDINGS

2.2.1 Previous studies

The information value of a bond rating change is quite ambiguous. Some of the earlier studies under this topic e.g. Pinches and Singleton (1978), state that their findings provide strong support for the proposition of very small information content of rating changes. Wakeman and MacDonald (1990) also argue that the rating agencies merely summarize existing public information, questioning the actual value-added of these ratings in providing new information to investors.

One reason for companies to request a bond rating is to provide the rating agency with inside information, which could show up as a higher rating instead of disclosing such specific information into the public, adversely affecting the company's position compared to its competitors. This explanation is strongly complemented by the study of Jorion *et al.* (2005) on the Regulation Fair Disclosure, which states that the informational effect of downgrades and upgrades is much greater after the implementation of Regulation Fair Disclosure[2]. Credit rating analysts now have the access to more confidential information about the companies, forbidding companies to disclose this kind of information to other securities professionals anymore. This is believed to increase the informational value of the credit ratings and supporting the existence of ratings and rating agencies. In contrast to earlier studies, Jorion *et al.* (2005) find that stock market reaction to upgrades becomes significant after the Regulation Fair Disclosure, which is especially important considering the increased role of credit rating agencies' ratings due to Basel II. They also report that large firms and firms with greater analyst following were more likely to practice selective disclosure and Regulation Fair Disclosure had a greater impact on the disclosure practices of those firms.

One reason to question the low information value of rating changes is proposed in a study by Goh and Ederington (1993). The study underlines, that it is inappropriate to assume that a downgrade necessarily has negative implications to stockholders without considering the

[2] Regulation Fair Disclosure, implemented on October 23, 2000, prohibits U.S. public companies from making selective, nonpublic disclosures to favored investment professionals. Regulation Fair Disclosure has a number of exclusions, however, including disclosure of nonpublic information to credit rating agencies. As a result, credit analysts at rating agencies have access to confidential information that is no longer made available to equity analysts, potentially increasing the information content of credit ratings.

cause. A credit rating change might be caused by negative information about a company's earnings or sales, or it might be caused by increased leverage. In the former example one would expect negative implications from the *stockholders*, but in the latter example a downgrade should not be followed by a negative reaction from *stockholders*, since it means that the company is transferring wealth from bondholders to stockholders. Thus, bond prices should fall but equity prices should rise. Asset-substitution theory suggests that bond- and stock-price reactions move to opposite directions; *stockholders,* as holders of residual claims, benefit when the issuer's risk is revised upwards by investors, whereas *bondholders,* as holders of senior claims, lose from such a revision (See Kliger and Sarig, 2000). Investor's reactions to credit changes, without analysing the actual reason behind the change, might actually explain the case of insignificant rating upgrades. If some upgrades are attributable to higher earnings or sales and others to lower leverage, both positive (former) and negative (latter) implications are observed by *stockholders*, possibly making the rating upgrade insignificant when measured the performance in the stock market.

Jorion and Zhang (2005) conclude the importance of initial credit rating in predicting the magnitude of the market reaction on the rating announcement. They claim that the effect on the stock market is notably greater when a rating change starts from a lower initial level, and suggest that this might actually prove to be the explaining factor between significant downgrade announcements and insignificant upgrade announcements. "If downgrades more often start from lower initial ratings than upgrades, it is not surprising to observe an overall stronger stock price effects for downgrades". Their results also provide evidence that refutes previously a highly common hypothesis concerning the investment-grade threshold, i.e. contrary to many previous findings they denote that a rating upgrade (downgrade) across the speculative-grade barrier does not contain a significance found in previous studies, once the initial rating is taken into account.

Further explanations between observed significant rating downgrade announcements and insignificant rating upgrade announcements are provided by Ederington and Goh (1998). In their study between bond rating agencies and stock analysts, they hypothesize that companies voluntarily release good news to the market but are reluctant to release unfavourable information, which might lead to bias in the market perception over negative information content of credit rating changes. Another explanation they provide is that rating agencies might allocate more resources to detect deteriorations in credit quality due to higher

reputational costs inherent of being unable to notice a decline in company's credit quality, thus possibly escalating to famous bankruptcy cases like the one of Enron.

Dichev and Piotroski (2001) highlight, that the underperformance of downgrades is more pronounced for small firms and firms with non-investment grade debt. The reason for the underperformance relating to non-investment grade debts might actually be explained by Jorion and Zhang (2005) above. The former notion is also complemented by Fama (1998), who finds that most long-run abnormal returns occur for smaller and under-followed firms, who have a greater potential for informational inefficiencies. Dichev and Piotroski also find that bond downgrades are followed by substantial negative abnormal returns that persist up to three years after the announcement. This might also be a partial explanation for the insignificant market reaction following upgrades, since all the previous studies as well as my study, report a skewed ratio of 1:2 between the announcements of upgrades and downgrades.

2.2.2 Findings

This subchapter will give the reader an insight to the major findings in previously published studies. Virtually all of the major papers are using data from the US markets to answer the question, whether credit rating upgrades or downgrades actually possesses informational value to investors and if the market performance, measured either as stock- or bond price, is significantly different from zero during the event window. The following studies are presented in the given order to emphasize their importance and similarity compared to my research paper.

A study by Steiner and Heinke (2001) serves as a core paper in my study, since it is the only major study using European data. The paper examines daily excess German Eurobond returns during announcements of rating changes and watch listing's by Standard & Poor's and Moody's between 1985 and 1996. They find significant negative excess returns after downgrades of the magnitude -0.395% between days 0 to 5 and they conclude that rating agencies ratings tend to lag rather than lead the markets by discovering a highly negative excess return of -1.256% before event date, between -90 to -1. Contrary to most other studies, they also find that there is positive and significant "rebound" in excess returns between trading days +15 and +21 and offer an explanation of overreaction hypothesis, first stated by De Bondt and Thaler (1985). After rating upgrade, they do not find significant excess returns

on the announcement date or during the days before or after the event. As in the case of downgrades, they argue that ratings seem to lag the market in the announcements, since they find a cumulative excess return of +2.543% between -180 to +180, from which two thirds is reached before day 0.

The most comprehensive study conducted with US data thus far, is probably the one from Dichev and Piotroski (2001) as they use essentially all Moody's bond rating changes between 1970 and 1997 to study long-run stock returns following rating changes. They group upgrade firms and downgrade firms into portfolios and track mean portfolio returns following rating changes for different time horizons to overcome the possible cross-sectional dependencies in returns. Their study finds no reliable abnormal returns for stocks with upgrade, but reveals substantial negative abnormal returns following downgrades. The downgrades are reported to vary between 10 and 14 percent in the first year following a downgrade and seem to persist up to three years after the announcement. They also state that this underperformance is especially pronounced for small, low credit quality firms.

A third major study was conducted by Hand et al. (1992) by examining daily excess bond and stock returns in the US markets after actual credit rating changes and watch listing's by Moody's and Standard and Poor's between 1977 and 1982. The study observes significantly negative average excess bond and stock returns after downgrades, but some weaker and considerably less significant positive average excess bond returns after upgrades. Following a downgrade, mean excess stock returns for a two-day period from day 0 to +1 for the whole sample and for speculative grade sample are -1.52% and -4.22%, respectively. An earlier study by Holthausen and Leftwich (1986) about bond rating changes on common stock prices reports identical results as far as the significance of rating upgrades and downgrades is concerned. Following a downgrade, mean excess stock returns for a two-day period from day 0 to +1 for samples consisting of across class changes and within class changes are -2.66% and -0.27%, respectively.

Earlier US studies by Weinstein (1977) on monthly bond returns, Pinches and Singleton (1978) on monthly stock returns, and Wakeman (1978) on monthly stock- and weekly bond returns are all inconsistent with the previously expressed, since they do not find significant price movements associated with either rating upgrades nor downgrades.

2.3. THE BASEL ACCORD AND THE INTERNAL RATINGS-BASED (IRB) APPROACH

2.3.1 The Basel accord

Regulatory capital standards are set by an internationally-agreed document known as the "Basel Accord", originally promulgated in 1988. This document, agreed by the Group of Ten (G10) banking supervisors operating under the aegis of the Basel Committee[3] on banking supervision, establishes common international standards for the definition of regulatory capital and the method by which the adequacy of capital is evaluated for internationally-active commercial banks (See Ong, M., 2003). One might question whether a focus on internationally-active commercial banks alone satisfies the vast field of credit intermediaries, but as Table 6 shows, banks have clearly remained a dominant force in credit markets. This is why I believe it is utterly important to broaden one's knowledge of the new Basel Accord and especially the Internal Ratings-Based (IRB) approach to commercial banks, before going further with the analysis.

The Initial Basel Accord, promulgated in 1988 and implemented in 1991 was relatively simple to negotiate and finalize, but it was revolutionary in a sense that it linked regulatory capital requirements to certain risks associated with specific types of assets on a bank's balance sheet. For the first time, a mechanism called "risk weight" was implemented to summarize a specific percentage of exposure that acted as an origin when deciding the amount of required regulatory capital. Due to the simplicity of these risk weights, banks subject to the accord soon started to engage in regulatory capital arbitrage, which enabled them to reduce their regulatory capital requirements without actually decreasing their underlying risk. As the 21st century was approaching and due to certain market developments, like the Asian financial crisis, it became apparent that the Accord needs to be adjusted to fulfil its original goal of ensuring banking system safety and soundness.

In January 2001, the Basel committee released the second proposals for the new capital accord, which modified and expanded the earlier version of June 1999. This new proposal

[3] The Basel Committee on banking supervision consists of banking supervisors from the following countries: Belgium, Canada, France, Germany, Italy, Luxembourg, Japan, Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The EU has observer status. It has no formal legal authority to issue binding rules or regulations. It has no formal authority to enforce compliance with its standards. Nonetheless, the consensus views of the Basel Committee as expressed trough documents such as the Basel Accord are treated as binding agreements and are implemented by national regulatory authorities.

builds on three main pillars to assess a financial institution's capital adequacy as shown in Figure 1:

1. **Minimum capital requirements** that are more risk-sensitive than those in the original Basel Accord of 1988 (Basel I);
2. An effective **supervisory review process;** and
3. More effective use of **market discipline** trough enhanced public disclosure.

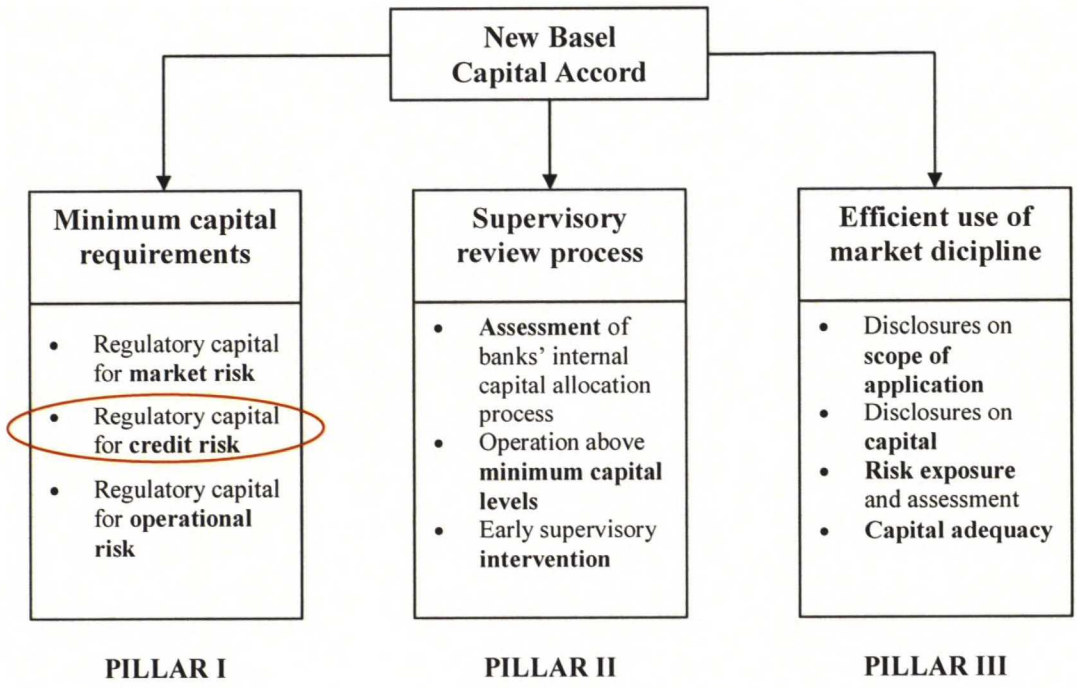

Figure 1. The three pillars of the Basel II proposal (Modified Ong, M., 2003)

PILLAR I:

The Basel committee was focusing on eliminating the "one-size-fits-all" approach in assessing regulatory capital by creating "standardised approach" which would rely on *external credit ratings* provided by rating agencies and the "IRB approach", or *internal ratings-based approach* for more advanced banks. According to its name, *internal ratings-based* approach relies on the banks' own data concerning customers and to the internal ratings derived trough the process. The IRB approach is further divided into the "foundation IRB approach" and the "advanced IRB approach". The Foundation IRB approach focuses more on

supervisory parameters that are carried over from the standardised approach and is less concerned about bank's own parameters, whereas in case of a "advanced IRB approach" the bank determines the entire set of input data internally.

A bank becomes eligible to use the foundation or advanced IRB approach only, if it can demonstrate that it meets the minimum requirements of the broad categories, set forth by the Basel Committee (See Appendix 2). The "standardised approach" received strong criticism from behalf of commercial banks, rating agencies and other financial market participants who questioned the reliance on external rating agencies to set capital requirements for banks.

2.3.2 IRB Approach

Relying on internal estimates in the credit risk context represented a major leap of faith by the Basel committee for two reasons. First, credit risk remains by far the largest exposure type represented on banks balance sheets. Relying on internal ratings would, therefore implicitly cede some control over capital requirements from regulators to banks and also require bank supervisors to have greater confidence in banks' internal systems and risk control processes. Second, banks still play a unique role in intermediating credit risk within economies. Even though market dynamics are changing, banks remain the main institutions for transmitting economic policy through their intermediation and payment system functions and therefore, any missteps in setting prudential standards for banks could generate unanticipated ripple effects in the economy (See Ong, M., 2003).

Therefore, under the Basel II proposal bank's ratings and their credit risks are measured trough constant validation and back-testing, which will be a core component of ongoing supervision and regulation. Banks' credit policies must be designed to specify the criteria for internal robustness, minimum data requirements and model oversight responsibilities within the organisation. The importance of strong credit culture is expected to have an accentuated role under the new proposal in the future. A bank's credit culture is the unique combination of policies, practices, experience and management attitudes that define the lending environment and determines the lending behaviour acceptable to the bank. A strong credit culture permeates the organisation from top to bottom; it is felt rather than defined (See Barr Taylor and McWhorter, 1992). Due to this increasing responsibility by creating internal credit ratings

based on self-collected data, the primary work of regulators switches even more towards supervision and setting requirements on the bank's internal credit rating creation.

Under the IRB approach, banks are expected to define four major input figures to derive risk assessment and capital determination for their individual borrowers:

1. *Probability of Default* (PD) of a borrower or group of borrowers (the key concept on which the IRB approach is built);
2. *Exposure at Default* (EAD), which may be a result of borrower decisions or external conditions in the case of market-driven exposures;
3. *Loss Given Default* (LGD) (expressed as a percentage of the exposure) estimates the proportion of any exposure that will be lost given the borrower's default; and
4. *Maturity* (M) of exposures.

For the "foundation IRB approach", only the PD is determined internally and remaining inputs are provided trough the application of standardised supervisory rules. In the "advanced IRB approach", banks provide internal assessments for all four input parameters by using self-collected data.

In the standardised approach borrowers are assigned to one of five risk weights (0%, 20%, 50%, 100%, and 150%) on the basis of standard supervisory treatments taking into account assessments provided by external credit rating agencies (see Figures 2 and 3), whereas the IRB uses a much finer differentiation in obtaining corresponding risk weights (See Figure 4). In the IRB approach, estimates of PD, EAD, LGD, and M are developed separately and then used as inputs producing more risk-sensitive capital adequacy framework.

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	Unrated
Risk Weights	20%	50%	100%	150%	100%

Figure 2. Risk weights for *corporate* under the standardised approach (See BIS, 2001d)

Credit Assessments	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Risk Weights	0%	20%	50%	100%	150%	100%

Figure 3. Risk weights for *sovereign* under the standardised approach (See BIS, 2001d).

As Figure 4 reveals, the biggest change has occurred in defining the risk weight, when moving from the standardised approach towards the IRB approach. EAD (Exposure at default) is calculated more or less the same way, as it used to be defined under standardised approach, but in addition to the revision of calculating the risk weight, an adjustment for risk diversification called granularity is also taken into account.

BRW stands for benchmark risk weight and it is calculated based on classification of exposure (corporate, bank, sovereign, retail, project finance, equity) and maturity, whereas *granularity* of a bank portfolio describes the extent to which there are significant single borrower concentrations. A risk-weighted asset (RWA) is defined as the risk weight of a transaction multiplied by a measure of exposure for that transaction. Total risk weighted assets are the sum of individual RWA across all transactions (See Basel committee on banking supervision, 2001e).

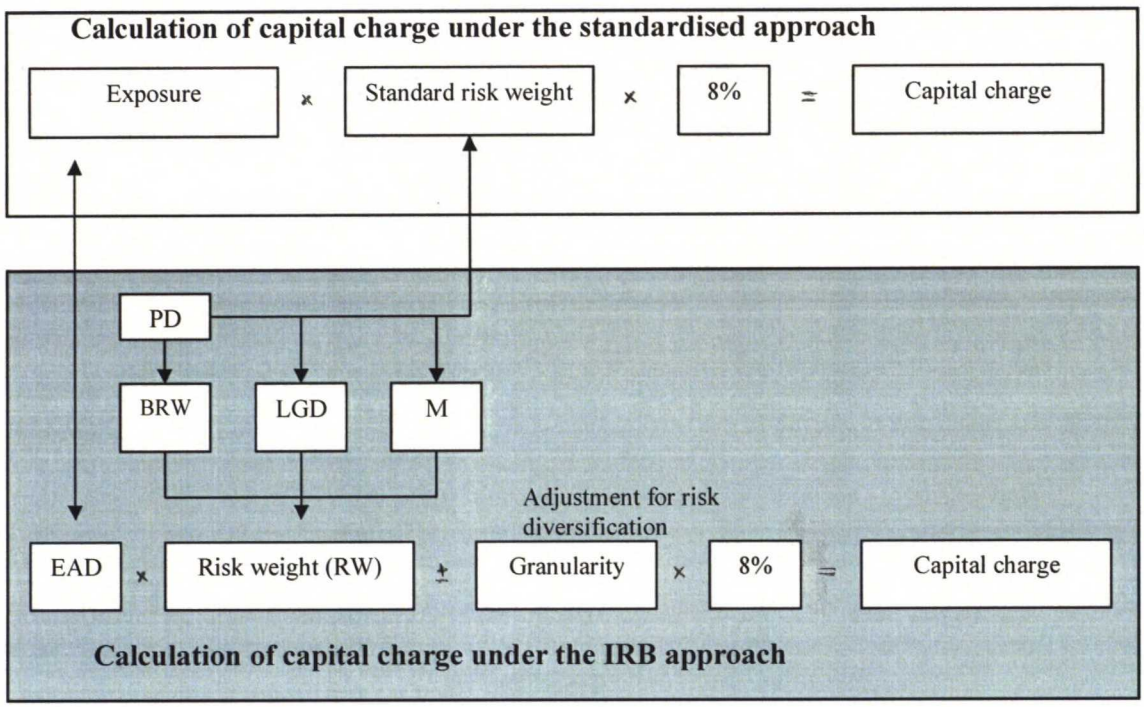

Figure 4. Comparison of standardised and IRB approach (Modified Ong, M., 2003)

It is stressed that some obvious problems are inherent to the companies' internal ratings based approach. Some argue that the number of rating categories is not always adequate when banks use mapping techniques in converting agencies' external credit ratings to their own categories, forcing them to compress too large of a bulk of issuers and issues to a small

number of categories. There is also concern over the cost for banks to create these ratings as well as the time consumed in creating them, thus possibly demanding more employees or at least higher amount of work in some departments. Another problem relates to how frequently these ratings are updated by banks, because of high expense of credit review. If these ratings are updated only on a "point-in-time" basis, it is unclear whether they are able to incorporate all the major changes relating to a specific company or issue. Finally, the ratings provide no information on relative risk, pricing, hedging or valuation unless combined with some other information, such as historical information on defaults. Many smaller banks do not possess this kind of adequate default information, thus casting a shadow over the usefulness of the IRB approach to some smaller banks.

PILLAR II:

As stated earlier, due to banks' own internal rating systems banking supervision is expected to have greater confidence in each bank's ability to set internal ratings or translate external ratings to meaningful capital requirements. For some countries, namely the US and the UK, pillar two did not possessed a major shift from current practice, since in both countries banking regulators also have supervisory authority to conduct on-site inspections and adjust capital requirements according to findings. The acceptance of pillar two was more significant in countries, where the legal system is based on codes (e.g. continental Europe), and where the banking regulators do not necessarily possess adequate resources or authority to undertake supervisory activities.

Therefore banks urged the Basel committee to state clear and transparent implementation rules for using pillar two, as this would unify practices in different countries. The Basel committee answered, by introducing two new bodies. First, the Financial Stability Institute[4] was introduced to provide intensive training programs to banking supervisors and secondly, in early 2002, an "Accord Implementation Group" was established to identify possible implementation problems regarding the new capital framework.

[4] The Financial Stability Institute was created in the wake of the Asian financial crisis, under the umbrella of the Bank for International Settlements. Its mandate is to train financial supervisors, and thereby, to increase the robustness of financial market oversight throughout the world.

PILLAR III:

The objective of the third pillar is to provide supervisors with adequate amount of transparency in banking markets by including an affirmative disclosure obligation within the regulatory capital framework. The idea behind this was to harness market discipline to supervisory goals, which caused some concern among bankers, regarding the specific disclosure proposals.

As the new Basel accord will lead to greater market pressure and higher operating costs for banks trough the IRB approach, and possible implementation problems for supervisors, it will also increase the demand for external credit ratings around the world. This is because borrowers with strong balance sheets will benefit from a high quality rating by qualifying for lower risk weights in the standardised approach, thus appearing more interesting to banks. The relative proportion of borrowers in each rating category is not clear, although as a general proposition it is safe to say that high quality obligors tend to outnumber lower quality ones in any given financial system (Ong, M., 2003 p, 283).

3. CREDIT RATINGS AND THE CREDIT RATING PROCESS

3.1 CREDIT RATINGS

A credit rating is an evaluation of creditworthiness or, as defined by Moody's, *"opinion of the future ability, legal obligation, and willingness of a bond issuer or other obligor to make full and timely payments on principal and interest due to investors"* (Moody's 2003).

A credit rating can be assigned to an issuer or a single issue. An issuer credit rating is a credit rating agency's view of the obligor's overall financial capacity (creditworthiness) to meet its financial obligations. Individual bonds (issues) launched by a company (issuer) can be rated higher or lower than the actual issuer rating, depending on their characteristics and relative priority. Junior obligations are typically rated lower than senior obligations, to reflect their

lower priority in bankruptcy. Different rating types by rating specificity are presented in Figure 5.

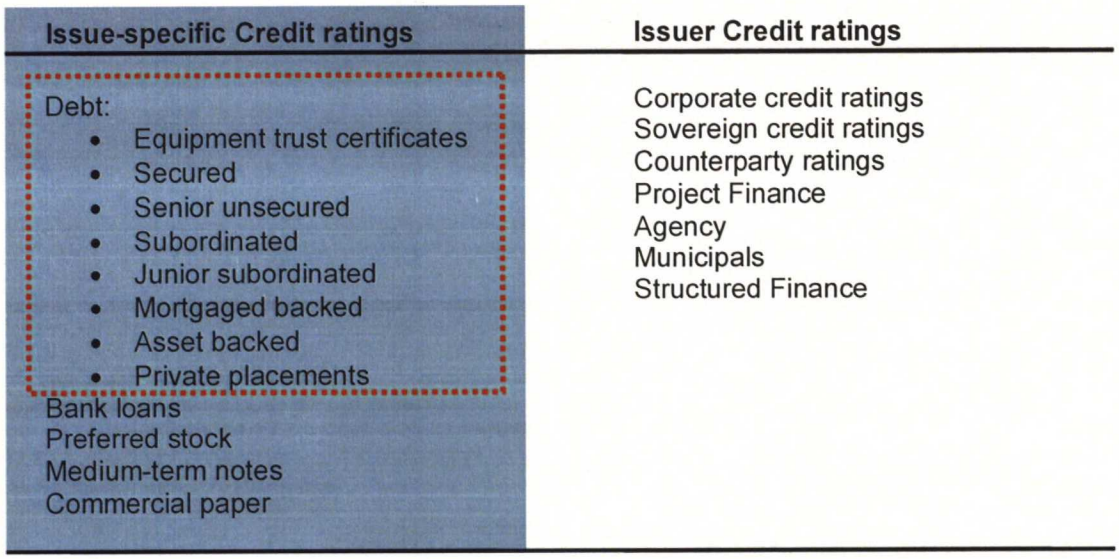

Figure 5. Rating types (Modified S&P and Moody's and Ong, M., 2003)

My study concentrates on issue-specific debt ratings (highlighted with a red broken line in Figure 5) to capture the information content of the credit rating changes, consistent with all existing studies. One possible reason for previous studies to focus on issue-specific ratings is the sheer number of observations reached, compared to issuer-specific ratings. Issue-specific credit ratings are further divided into debt, bank loans, preferred stock, medium-term notes and commercial paper, but I have only included bonds recorded as debt in Figure 5. Issuer-specific credit ratings include corporate, sovereign, counterparty, project finance, agency, municipals and structured finance.

Another classification in credit ratings is the division between Long-term and Short-term credit ratings. Long-term credit ratings are divided into several categories ranging from 'AAA', reflecting strongest credit quality to 'D', reflecting the lowest (see Table 1). A short-term credit rating is an assessment of an issuer's or an issue's credit quality with respect to an instrument considered short-term in the relevant market. Medium term notes are assigned long-term credit ratings. Figure 6 represents a division of credit ratings with respect to time frame and rating specificity.

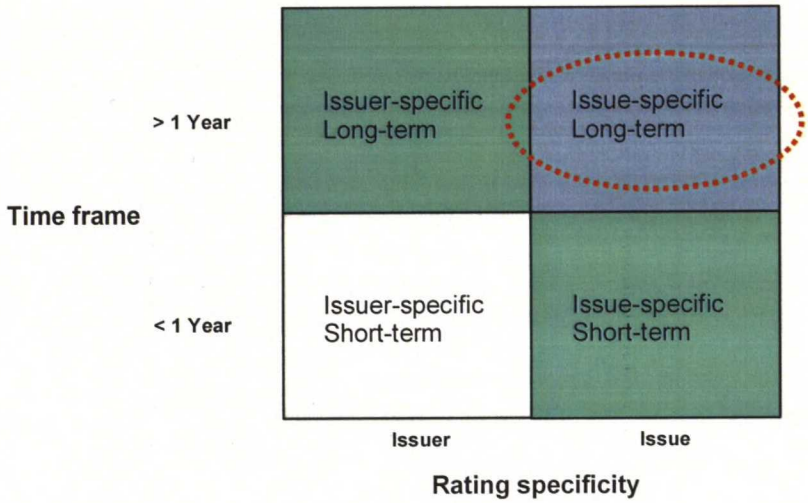

Figure 6. The different types of credit ratings (Modified S&P, 2006)

My final sample consists of issue-specific long-term credit ratings, highlighted with a red circle in Figure 6. To my knowledge, all the major studies use long-term credit ratings instead of short-term ratings and almost all studies use issue-specific ratings, excluding some studies on sovereign ratings.

Table 1. Classification by credit ratings

Interpretation of various Long-Term Issue Credit Ratings issued by the three major rating agencies

explanation	**Standard & Poor's** (modifiers)	**Moody's** (modifiers)	**Fitch** (modifiers)	**Cardinal scale**
Investment grade				
Highest grade	AAA	Aaa	AAA	1
High grade	AA (+, none, -)	Aa (1,2,3)	AA (+, none, -)	2, 3, 4
Upper medium grade	A (+, none, -)	A (1,2,3)	A (+, none, -)	5, 6, 7
Medium grade	BBB (+, none, -)	Baa (1,2,3)	BBB (+, none, -)	8, 9, 10
Speculative grade				
Lower medium grade	BB (+, none, -)	Ba (1,2,3)	BB (+, none, -)	11, 12, 13
Speculative	B (+, none, -)	B (1,2,3)	B (+, none, -)	14, 15, 16
Poor standing	CCC (+, none, -)	Caa (1,2,3)	CCC	17, 18, 19
Highly speculative	CC	Ca	CC	20
Lowest quality	C	C	C	21
In default	D		DDD/DD/D	22

Nationally recognized statistical rating organizations, NRSROs[5] (Moody's, S&P and Fitch) classify companies and their specific loan issues into ten major Long-Term Issue Credit Rating classes demonstrated by Table 1. These credit rating agencies use quite similar rating grades, where highest-quality bonds are rated triple-A (Aaa by Moody's), followed by double-A (Aa by Moody's), singe-A, BBB (Baa by Moody's) and so on, until D (except for Moody's). For the classes from AA to CCC, S&P and Fitch also supply modifiers, such as A+, A, or A-. Similarly, Moody's rates bonds from Aa to Caa, with modifiers such as A1, A2, or A3. Altogether, there are 22 credit rating classes starting with 1 as AAA, 2 as AA+, 3 as AA, 4 as AA-, and so on until 22 as the default category D. A full list of Long-Term Issue Credit Ratings and their definitions by Standard & Poor's can be seen in Appendix 3. Bonds rated BBB- (Baa3 for Moody's) or above are known as *investment-grade* bonds, and similarly bonds rated below them as high-yield, or junk bonds. This threshold plays a crucial role in many instances, because some investors' e.g. commercial banks and many pension funds are prohibited from holding non-investment-grade bonds.

While the two dominant credit rating agencies (S&P and Moody's) are usually viewed as substitutes, in fact, their definitions of ratings are quite different. S&P states that "rating definitions are expressed in terms of default risk" whereas Moody's concludes that "ratings are statements about expected loss". This distinction is apparent in their rating categories as well; S&P has a category "D" for defaulted issues/issuers, while Moody's does not present such a rating grade (See table 1). According to these rating grade definitions, a defaulted bond rated as "D" by S&P might in theory have a Moody's rating ranging anywhere in the speculative grade from Ba to C depending on industry analysts' expectation of the ultimate recovery (See chapter 3.3). One possibility is a fully guaranteed bond by a defaulted issuer, which might in theory have any rating, provided that the expected loss is zero with a high degree of certainty.

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[5] In 1975 the US Securities and Exchange Commission (SEC) initiated the designation of bond rating firms as "nationally recognized statistical rating organizations" (NRSROs). At the time of initial designation, the SEC accepted Moody's, S&P and Fitch as the only *general-purpose* NRSROs. It subsequently designated Duff & Phelps (1982) and McCarthy, Crisanti & Maffei (MCM) (1983) as NRSROs (MCM was absorbed by Duff and Phelps in 1991), and designated IBCA (a UK firm) (1991) and Thomson BankWatch (1992) as NRSROs for the *banks and financial institutions*. Fitch merged with IBCA in 1997, and the combined entity was subsequently bought by FIMALAC, a French conglomerate. In June 2000 Fitch bought Duff & Phelps and in December 2000, Fitch absorbed Thomson BankWatch. The SEC has not granted the NRSRO designation to any new entities since then, despite applications by many non-US firms, raising the barrier to entry and drastically limiting the supply trough regulatory means. Detailed criteria by SEC for designating NRSROs can be found in Appendix 1.

3.2 CREDIT RATING AGENCIES

The birth of the credit rating industry dates back all the way to the early 20th century America. The financing of vast railroad projects was supported by the development of a huge domestic and international bonded debt, ultimately leading to the first rail road bond ratings in 1909 by John Moody, founder of the Moody's Investor service. These ratings were soon followed by Poor's Publishing Company in 1916, Standard statistics company in 1922, and Fitch publishing company in 1924. As mentioned earlier, the only credit rating agencies approved as general-purpose NRSRO's (1975), and by far the largest in the world, are Moody's Investor Service, Standard and Poor's, and Fitch. The undisputed reputation of these agencies accumulated on the long-run, coupled with a regulatory restriction have surely been a crucial elements in conveying trust among the non-specialist bondholders.

These major credit rating agencies possess a number of virtues, widely acknowledged by investors. First, they have a long history of practical application at most large banks and companies. Second, they possess a large database for rating migration of both individual credits and portfolio composition. And third and possibly most importantly, the system is easy to understand and well understood by investors.

In addition to these virtues, credit rating agencies possess some additional benefits compared to banks IRB ratings. Rating agencies cover a larger range of the major corporate market than most banks have in their portfolios, allowing risk analysis on potential as well as actual borrowers. They typically cover a longer history for each borrower than most banks would maintain for the same borrower. They also have international credibility because of their history and extensive testing of their relative performance. Finally, they are derived more independently of the conflicts of interest that may exist within an internal ratings based approach at a bank. Credit rating agencies have decided to remain separate from borrowers and lenders, unlike banks who offer them all kinds of services, from simple loans to structured securities.

3.2.1 Structure

Moody's and Standard & Poor's are much larger, and probably more widely known than Fitch. Moody's is the only freestanding company of the three agencies, and S&P credit rating

activities are just a part of larger financial services provided by S&P, which in turn is owned by McGraw Hill, whereas Fitch is owned by a French conglomerate FIMALAC (See footnote 5). Figure 7 lists some of the characteristics of these three major credit rating agencies as of 2001.

Moody's:

- Annual revenues: US$797 million of which 70 % arises in the US and 87 % is derived from bond rating
- Annual (after tax) net income: US$212 million
- Assets: US$505 million
- Employees: 1700, including more than 800 analysts

Coverage:

  - over US$30 trillion in debt issuances (ratings and analysis)
  - 128 000 corporate, government, and public finance issuances
  - 15 000 structured transactions
  - 4 300 corporate relationships
  - more than 100 countries (offices in 17 countries)

S&P:

- Coverage:
  - well in excess of US$11 trillion in debt issuances
  - more than 38 000 corporate, sovereign, municipal, and financial institution issuers
  - more than 98 000 issuances
  - more than 86 countries (offices in 16 countries)

Fitch:

- Annual revenues: US$260 million (as of 2000)
- Employees: 1200
- Coverage:

Figure 7. Characteristics of the three major bond-rating agencies (Modified Ong, M., 2003)

As Figure 7 shows, all three US agencies have branch offices around the world and the BIS (2000) report also reveals that Moody's and S&P provide extensive ratings coverage also in Europe (See Table 2).

Despite this extensive ratings coverage, the number of general-purpose credit rating agencies with headquarters in the given countries is amazingly low in Europe, as only Germany and Sweden report two rating firms and the remaining countries only one each. For instance, UK hailed as an international finance centre has only a "joint" headquarters of Fitch (with the US). Of course one could argue that assigning credit ratings is not locally-tied business, but as seen in the chapter explaining the credit rating process (3.3), an industry analyst of a credit rating agency is monitoring the issuer closely and handling both day-to-day contacting and meetings with management. It is clear that local presence and especially local knowledge of corporate culture and regulation helps in this task, also enabling credit rating actions in being more up-to-date.

Table 2 reveals a rough estimation of the number of rated companies in different countries by major rating agencies, as well as the size of the companies around the world. The left side of the table presents the number of rated companies in G10 countries (See 2.3.1 Basel Accord) and selected non-G10 countries divided between Fitch, Moody's and S&P. The right side of the table, on the other hand, sorts the rated companies in the G10 countries by turnover to give a further description of these markets. The countries that I have included in my study are highlighted with light turquoise. The bottom right corner of the table presents a very guide lining estimation of the overall ratings coverage of my study, highlighted with light blue. These coverage percentages are calculated by summing up the ratings of the companies included in my study, divided by the overall number of rated companies in the rest of the Europe.

Table 2 Credit ratings for banks, industrials and corporations (Modified Basel 2000)

Banks, Industrials and Corporate Ratings by Agency and Country/Number of Businesses (by G10 and selected non-G10 countries)

G10	Fitch		Moody's		S&P		No. Firms >= $10M		No. Firms >= $50M		No. Firms >= $250M		No. Firms >= $500M		
United States	415	46,5 %	3 313	70,3 %	2 544	75,9 %	155 500	75,1 %	37 826	18,3 %	9 035	4,4 %	4 819	2,3 %	207 180
France	111	12,4 %	256	5,4 %	257	7,7 %	26 309	77,7 %	5 581	16,5 %	1 280	3,8 %	684	2,0 %	33 854
Germany	41	4,6 %	316	6,7 %	78	2,3 %	42 851	76,9 %	9 700	17,4 %	2 101	3,8 %	1 100	2,0 %	55 752
Italy	31	3,5 %	91	1,9 %	70	2,1 %	20 372	82,8 %	3 497	14,2 %	493	2,0 %	228	0,9 %	24 590
United Kingdom	39	4,4 %	90	1,9 %	65	1,9 %	27 329	69,7 %	8 547	21,8 %	2 182	5,6 %	1 148	2,9 %	39 206
Japan	19	2,1 %	97	2,1 %	45	1,3 %	86 409	75,0 %	22 015	19,1 %	4 536	3,9 %	2 258	2,0 %	115 218
Netherlands	11	1,2 %	36	0,8 %	33	1,0 %	3 831	58,5 %	1 851	28,2 %	531	8,1 %	341	5,2 %	6 554
Sweden	7	0,8 %	23	0,5 %	24	0,7 %	5 214	78,3 %	1 105	16,6 %	231	3,5 %	106	1,6 %	6 656
Luxembourg	4	0,4 %	22	0,5 %	11	0,3 %	230	68,7 %	83	24,8 %	15	4,5 %	7	2,1 %	335
Belgium	6	0,7 %	13	0,3 %	10	0,3 %	6 008	78,0 %	1 354	17,6 %	232	3,0 %	108	1,4 %	7 702
Switzerland	4	0,4 %	19	0,4 %	7	0,2 %	4 413	68,2 %	1 358	21,0 %	450	7,0 %	252	3,9 %	6 473
Canada	n/a	0,0 %	n/a	0,0 %	n/a	0,0 %	14 172	74,6 %	3 325	17,5 %	956	5,0 %	534	2,8 %	18 987
							392 638	75,1 %	96 242	18,4 %	22 042	4,2 %	11 585	2,2 %	522 507
Non-G10 (Selected)															
Spain	56	6,3 %	41	0,9 %	29	0,9 %									
Finland	4	0,4 %	21	0,4 %	11	0,3 %			Fitch		Moody's		S&P		
Denmark	3	0,3 %	8	0,2 %	2	0,1 %			303		882		569		
Rest of Europe	141	15,8 %	367	7,8 %	167	5,0 %			66,2 %		67,7 %		74,5 %		
	892	100 %	4 713	100 %	3 353	100 %			Coverage		69,4 %				

Table 2 presents a number of rated issuers by major credit rating agencies in G10 countries, as well as in selected non-G10 countries. The right side of the table classifies the companies in G10 countries into four different groups by the size of their turnover. Corresponding percentages are also introduced, both for number of rated issuers and for the issuers of different size. The countries included in my study are highlighted with light turquoise. A guide-lining coverage estimations of my study are highlighted with light blue in the bottom right corner of table 2.

It becomes apparent by looking at the left side of the table that a vast majority of rated companies in the world come from the United States. Over 70 percent of the rated companies by both Moody's and S&P come from the US alone. This further fortifies the question, whether these US-based credit rating agencies are the right quarter to rate all the companies around world, or whether it would be more appropriate for European countries to have a more nationally-based credit rating industry. All nine European countries included in my study (highlighted with light turquoise) are among the most rated countries in Europe. The only

notable deviation is perhaps the somewhat modest rating activity in the European financial center, the United Kingdom.

When you look at the size of the companies in the G10 countries, it is safe to say that the markets are dominated by small firms. Over 80 percent of the firms in G10 countries are smaller than $50M, measured by turnover and less than 5 percent of the companies report a turnover higher than $250M. The United Kingdom and Netherlands are the two countries included in my study where firms are slightly more prone to have higher turnovers, whereas Germany and Italy with their 'Mittelstand'[6] and 'Industrial district'[7] firms respectively, are dominated by smaller firms.

The coverage ratios in Table 2 reveal, that the countries included in my study account on average around 70 % of all the ratings in Europe. However, I would like to point out that the number of rated entities is expressed only in absolute number and their relative exposure to my study is omitted from the table. Banks clearly have stronger emphasis in my study, concerning issue-specific ratings since on average they possess substantially higher amount of issue-specific ratings, compared to other companies (See Table 6). This could be viewed as a restriction when analysing the coverage estimates of table 2 and I would like to stress that the meaning of this calculation is only to give a guide-lining estimation of the scope of my study.

3.2.2 Revenues

All major credit rating agencies earned their revenues primarily by selling publications containing their ratings up until the early 1970. In 1970 Moody's and Fitch started to charge the issuers of the bonds for providing a credit rating, thereby reversing the payment responsibility from bondholders to bond issuers. This pattern was embraced by Standard & Poor's a couple of years later, although they started to charge fees from municipal bond

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[6] Mittelstand' normally means a German small and medium-sized enterprise (SME), which are typically 1) owned and managed by a family, 2) owned by family but run by an outside management team, or 3) partially owned by family but with outside shareholders. In 2003, German mittelstand companies employed 70.2% of all employees in private business, according to the Institut für Mittelstandsforschung.

[7] 'Industrial district' implies the ways in which economic specialization arises through clustering in a particular industry-zoned urban area. Industrial districts in Northern Italy have a coherent location and a narrow specialization profile, e.g. Prato in woolen fabric, Sassuolo in ceramic tiles or Brenta in ladies' footwear. The success of SME-based Italian districts was one of the factors that motivated companies to adopt cluster promotion as an approach to stimulate growth and job creation, but more recently, Italian industrial districts have been linked to Italy's poor growth performance. Firms in industrial districts battle to internationalize production, and they have only limited resources to invest in research and development.

issuers already in 1968. By now, a clear majority of the credit rating agencies incomes are coming from the fees paid by the issuers.

Both Moody's and Standard & Poor's are following similar principles in invoicing and publishing of corporate issuers; they state that they will rate and make public all SEC-registered corporate bonds, whether requested by the issuer or not. By contrast, Fitch only carries out solicited ratings of any type of security. For issuers not requesting a rating for their bonds, S&P and Moody's are providing an unsolicited rating which is usually viewed as less reliable, than the solicited one provided by a company's request. This is believed to have an increasing effect on the activity of issuers demanding ratings for their bonds, since it is clear that companies are able to provide rating agencies a more thorough view of their actual position and outlook, if they decide to request a rating (See 3.3 Credit rating process). In case a company does not request a rating, the information behind the rating is restricted to publicly available information, i.e. the same information available for all investors. This is why virtually all corporate issuers request a rating, believing that they are able to convince the rating agencies to publish a more favourable rating. The fees invoiced by agencies from issuers of the bonds are remarkably similar, although there is a correlation between the reputation and spreads charged by agencies (See Figure 8).

List prices to issuers for requesting a rating by Moody's and S&P:

- 3.25 basis points (bp) on issues up to US$500 million, with a minimum fee of US$25 000 and a maximum of US$125 000 (S&P) or US$130 000 (Moody's);
- Both charge an additional 2bp on amounts above US$500 million (S&P caps the amount at US$200 000 and it also has a one-time fee of US$25 000 for first-time issuers);
- Both offer negotiated rates for frequent issuers and offer quarterly charges on amounts outstanding for issuers of commercial paper.
- S&P carries out only solicited ratings for structured securities and Non-US company bonds, whereas Moody's provides unsolicited as well as solicited ratings of such securities.
-

The list prices to issuers for requesting a rating by Fitch and Duff & Phelps (before its merger with Fitch) are mildly more modest:

- Fitch is charging 2.5bp from the issuers and Duff & Phelps 2.75bp.
- Both Fitch and Duff & Phelps have carried out only solicited ratings of any type of security.

Figure 8. Fees charged by major credit rating agencies (Modified Ong, M., 2003)

The vast demand for ratings, coupled with the fees presented above have ensured that major credit rating agencies have prospered, simply by analysing the profit performance of these companies. Profit data is available only for Moody's, as it is the only free-standing company and the figures are somewhat staggering; between 1995 and 2001 Moody's reported a ratio of net income to total assets ranging from 28.3 % to 55 % with an average on seven years of 42.1 %. In this light it is not exaggerating to say that credit rating assignment is highly profitable business, and development of new debt instruments and securities as well as other innovations has only enforced this performance.

3.2.3 Problems

Even with all the worldwide coverage, reputation, and strong performance, the credit rating industry is still paired with some principle problems like moral hazard, efficacy and sample selection bias/survivor bias.

When considering the earnings model of credit rating agencies, there is a constant suspicion of moral hazard and opportunistic behaviour. Can investors truly believe in the objectivity of agency ratings, when the companies whose securities are rated, are the same ones that pay the notable consulting fees of the agencies. There is a clear possibility for rating agencies to offer a higher credit rating for company's security in exchange for a higher fee. Or conversely, rating agencies might try to force companies to subscribe for a rating by threatening them with a significantly lower unsolicited rating. In the defence of the rating agencies, it has to be said that there have not been widespread incidents of moral hazard or opportunistic behaviour[8]. It seems that credit rating agencies have understood the immense impact of the reputation in the credit rating business and the irreversible consequences following possible negative verdicts.

Even though it is widely known that credit ratings do correlate well with average default rates, this alone is no indicator of whether credit ratings provide extra and useful information to the investors. Moreover, there is variance around the average default rates embodied in each

[8] There have been some errors in judgement. e.g., in the Orange County debacle; See Figlewski and White (1995) and Jorion (1995). Further, in late 2001 and early 2002 there were widespread questions raised as to why the bond rating firms had not earlier flagged the weakening condition of the Enron Corp. There also has been allegations that Moody's has used low unsolicited ratings as a means to punish issuers for not requesting ratings; See Partnoy (1999).

rating and default probabilities associated with specific rating levels have drifted over time, making them less reliable as indicators of absolute credit risk (See Cantor and Packer, 1995). Another efficacy problem relates to credit rating migration across rating classes and the importance of credit rating migration matrices in general. Bahar and Nagpal (2000) conclude that Aaa-rated securities tend to retain their ratings longer than lower-rated ratings, i.e. ratings "drift" is increasing in proportion to their current rating.

And possibly one of the most striking problems relates to the regulation of credit rating agencies. Numerous legal rules and regulations depend substantively on credit ratings, and particularly on the credit ratings of a small number of Nationally Recognized Statistical Ratings Organizations (NRSROs). Moreover, the barriers for entering the NRSRO market are prohibitive (See footnote 5 and appendix 1). The result is that credit ratings issued by NRSROs seem to be valuable to financial market participants even if their informational content is no greater than that of the public information already reflected in the market. These regulations explain how credit ratings can have great market value but little informational value. To put it very simply, credit ratings are important because regulations say they are. Financial regulators have created a demand for credit ratings, but have not exhaustively specified the identities and qualifications of the raters.

3.3 CREDIT RATING PROCESS

Because of the increasing importance of credit ratings and their undisputed impact to cost of financing, issuers normally approach credit rating agencies to request a rating before the sale or registration of a debt issue. Issuers that are preparing their first issue are keen to know what kind of rating they can expect and existing issuers usually want to know both the level of upcoming new issue, as well as this issue's impact on the existing issue's rating. Since credit rating assignment is a consulting business, an exact credit rating process is impossible to obtain, but a typical and most common credit rating process is presented in Figure 9. It seems clear from agency materials, that the ratings are intended to be relative risk rankings derived from expert-based classification systems.

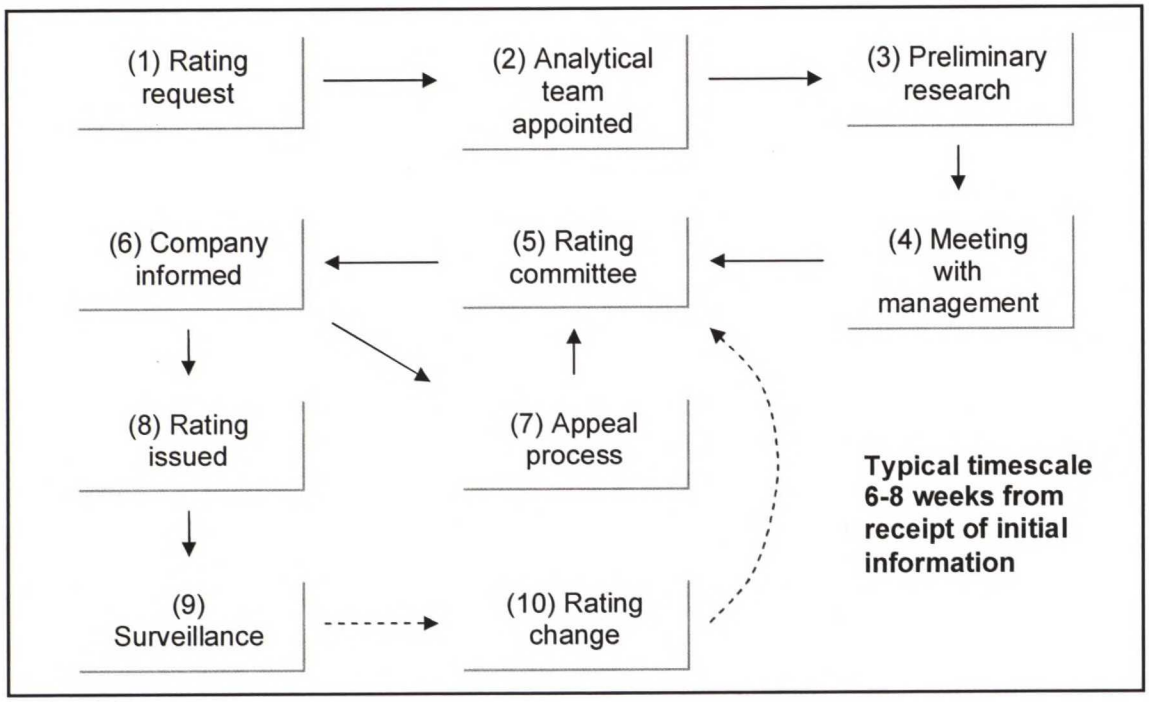

Figure 9. Standard & Poor's Credit rating process (Modified Ong, M., 2003)

A rating process starts up with a rating request (1) to a specific rating agency, who appoints an analytical team (2) to evaluate this particular company. An analytical team consists of analysts with the greatest relevant industry information, covering the entire spectrum of credit within that industry. While usually just one industry analyst handles a day-to-day contact with the issuer, a team of analysts possessing a more general knowledge of the analytical issues surrounding each relationship is assigned to contribute to the rating process of an issuer at hand.

An analytical team will conduct a preliminary research (3), a sort of due diligence for the issuer from the quantitative, qualitative, and legal perspective. During preliminary research the analytical team will evaluate the issuer's financial risk and business risk and in case of an issue rating, also the issue-specific features. The different components of business risk and financial risk are presented in Figure 10.

Industry characteristics
- Principal competitors
- Size of industry and market share trends
- Competitive position in relevant markets
- Significant industry developments
- Strength of industry prospects
- Vulnerability to technological change, labor unrest or regulatory interference
- Capital intensiveness of industry

Operational characteristics
- Breakdown of revenues, margins and cash flow by business segment
- Brand names, types and quality
- Characteristics of patents and proprietary knowledge
- Characteristics of research and development activity
- Description of principal suppliers
- Description of physical properties
- Capacity and utilization of facilities
- Subsidiary performance and intra-company dealings
- Government contracts and subcontracts
- Seasonality factors in business segments

Management
- Strategic plan for operations
- Description of directors and their affiliations
- Description of offers
- Organizational framework for operations
- Ownership of stock
- General assessment of credibility of management

Profitability
- Earnings record and budget for last 3-5 years
- Operating margin for business segments
- Fixed charge coverage trends
- Pretax return on capital employed
- Earnings comparison vs. competitors by business segment

Capital structure
- Leverage ratios
- Off-balance sheet financing
- Preferred stock characteristics

Asset Valuation
- Book, liquidating and market values
- Patents held
- Characteristics of inventory
- Aging of receivables and bad debt provision
- Characteristics of investments

Cash flow protection
- Cash flow ratios
- Working capital requirements
- Debt repayment schedule

Financial Policy
- Accounting controls
- Risk tolerance of management

Financial flexibility
- Contingent liabilities
- Insurance coverage
- Restrictive covenants in loan agreements
- Access to various capital markets
- Pension obligations
- Liquidity mesures

Figure 10. Analytical categories for rating issuer

3.3.1 Financial Risk

"Financial risk refers to risks of capital structure and a company's ability to meet fixed and senior charges and claims" (See Wild et al. 2003).

After receiving a rating request from a company, an analytical team will review prior publications of the company to define its financial position. The financial risk assessment is based on prior financial statements, financial and cash-flow projections, transaction documents and supporting legal opinion. Financial risk is divided into 6 different sub-

categories in Figure 10. However, it should be noted that the purpose of the figure is not to provide reader with an exhaustive list of the variables of risk, but to stress the numerical characteristics of financial risk.

3.3.2 Business Risk

"Business risk is the uncertainty regarding a company's ability to earn satisfactory return on its investments in light of cost and revenue factors, including factors of competition, product mix, and management ability (See Wild et al. 2003).

The other risk component - business risk, consists of the analytical team's opinion of key business factors, such as an issuer's industry fundamentals, prospects for growth and the issuer's vulnerability to technological changes or regulatory amendments. Since some industries are more volatile and bear higher risk than others, (e.g. Medical/Biotech Vs. utility sector) companies in different industry sectors with identical financial risk can be rated differently, because of higher industry-volatility and greater default sensitivity.

After a preliminary analysis of issuer's credit quality, the team of analysts' sets up a meeting with management (4). This meeting is an integral part of the rating process, with an objective to review in detail the company's operating and financial plans, management policies, and other factors affecting the upcoming credit rating. Only upper level management takes part in the meeting and usually the company's chief financial officer acts as a representative, while the chief executive officer only participates if strategic questions are discussed. Although agencies do not openly reveal their way of working, it is believed the meeting and preparation include the same basic structure in every case. Scheduling, facility tours and preparing for the meetings, as well as conduct of the meeting are believed to be quite standard procedures in the rating process. The aspect of confidentiality also plays a major role in the meetings, since agencies are provided with highly sensitive information about the company and its business.

After meeting with the issuer's management a rating committee (5), usually consisting of five to seven committee members, is convened. An industry analyst gives a presentation to the committee which includes rating methodology that pertains to the industry sector, but ultimately it will be a mix of financial and strategic perspective with a strong emphasis on

future plans rather than historical development. A rating committee also goes trough additional discussion when a specific issue is rated, focusing more on issue-specific factors.

When the rating committee has decided a rating, the company is informed (6) and supplied with the major considerations supporting it. Usually rating agencies provide issuers with a possibility to provide them new or additional data in the appeal process (7) prior to the rating publication. If the issuer decides to provide new information, the rating process returns to rating committee (5) who analyses the new information and decides whether to alter the original rating before the rating is issued (8) to the public.

Corporate ratings on publicly distributed issues are monitored for at least one year, after which, the company can elect an agency to maintain a chargeable on-going surveillance (9) of factors that could affect the rating. These factors include changes in the capital structure, or other major economic or industry-specific developments among others. Companies requesting a rating can decide whether to have an option of surveillance, or conduct's it on a "point-in-time" basis. Surveillance is maintained by the same industry analyst taking part in the rating process and he/she is provided with the interim and financial statements as well as periodic telephone contacts, to discuss with recent developments and future outlook.

Based on the issuer's performance or industry changes for instance, it will sometimes become apparent to reconsider the original credit rating (10). An industry analyst usually undertakes a preliminary review which may lead to a Credit Watch listing[9]. This is followed by a comprehensive analysis, communication with management and presentation for the rating committee (5), after which the rating process is exactly the same as with new ratings.

The major contribution of credit rating agencies is actually generated in this surveillance phase (9) and the speed of information is thoroughly tested in the markets to see if ratings

[9] Ratings appear on Credit Watch list when an event or deviation from an expected trend has occurred, or is expected, and additional information is necessary to take a rating action. For example, an issue is placed under such special surveillance as a result of mergers, recapitalizations, regulatory actions or unanticipated operating developments. Credit Watch listings can be "positive", "negative", or "developing", which is used when future events are so unclear that the rating may potentially be raised or lowered. Such rating reviews are normally completed within 90 days, unless the outcome of a specific event is pending. A listing does not mean a rating change is inevitable and rating changes can also occur without the rating appearing beforehand on Credit Watch. However, in some cases, it is certain that a rating change will occur and only the magnitude of the change is unclear. In those instances – and generally wherever possible – the range of alternative ratings that could result is shown. (See Ong, M., 2003)

really reflect future problems or just report the status quo. It is interesting to see, whether after the introduction of Basel II and the IRB approach, the informational level of credit ratings becomes higher than before, or alternatively this renewal has a negative effect on the overall reliability of credit ratings. Major critique has been represented towards agencies of their rather slow adjustment to company defaults like Enron and WorldCom (See Ong, M., 2003, Foreword XXVI).

4. DATA, DESCRIPTIVE STATISTICS AND METHODOLOGIES

4.1 DATA

The data consists of issue-specific long-term credit rating changes by major credit rating agencies, Moody's, Standard & Poor's and Fitch. This data is obtained for quite an extensive period from 1990 to 2007 for seven major European markets; UK, France, Germany, Nordic markets, Italy, Spain, and the Netherlands. Every market is represented by the constituents of the country's main index respectively; FTSE100, CAC40, DAX30, OMXN40, S&P MIB40, IBEX35, and AEX25. These main indices are expected to give a fair view of the country's markets as a whole, since e.g. FTSE100 Index covers around 80 % of the market value of the London Stock Exchange providing a vast and decentralized view of the market.

The sample of credit rating change announcements was manually gathered from Reuters Xtra3000 database by going trough the sample companies' bond history and recording all the rating change events. During the data collection process, the number of identical changes was also gathered for further analysis.

The issue-specific rating change date is defined by Reuters as "The date on which the value of a rating for a security as issued by a ratings agency was published and made effective". However, an announcement period from day 0 to 1 is used in the analysis since most of the rating change announcements are published after the markets have closed, thus postponing the informational effect measured by stock price reaction, to the start of the following day. Daily stock price performance for respective constituents was obtained from Thomson One Banker

for the whole time range, to calculate daily excess stock returns and for calculating Cumulative Abnormal Return's (CAR's). The Return Index from DataStream, defined as "The 12-month return assuming dividends are reinvested" was used to calculate these daily excess stock returns, according to previous studies.

An attempt to improve the validity of the results led to an exclusion of some extreme company-specific stock market events from the initial sample of observations. All observations characterised with daily stock price change greater than 30% within an event window were excluded from the sample. Similarly, observations occurring during an event window coincident with index changes greater than 10% were also excluded to restrict the impact of outliers to the results.

I have used a 61-day event window from t_{-30} to t_{+30} (See 4.3 Methodologies) and controlled coincide rating change events by allowing only one rating change to occur during the event period t_{-10} to t_{+10}. The effect to sample size of the study can be seen from Figure 11.

Some rating changes were recorded to take place outside usual trading days (e.g. for Saturday) in Reuters Xtra3000, but as mentioned earlier, most of the announcements are published after the markets have closed, thus it is highly probable that these announcements originally occurred of Friday. In these uncommon cases, the market reaction was tested the following trading day, i.e. on Monday.

The 1) original data consisted of 1808 credit rating events, dividing into 745 upgrades and 1063 downgrades, including 5 defaults (See Figure 11). After 2) coincident rating events were controlled, the data decreased to 1268 events from the original sample (-29.9%), with 499 upgrades (-33.0%) and 769 downgrades (-27.3%), including 4 defaults respectively. The data was further reduced into a 3) final sample of 486 upgrades (-2.6% from the previous sample) and 704 downgrades (-8.5% from the previous sample) including 3 defaults, since for some events, company's bond rating change occurred before stock listing or incomplete stock performance made the analysis impossible.

1) Total sample of rating changes

	UPGRADE		DOWNGRADE		TOTAL	
FTSE100	195	26,2%	372	35,0%	567	31,4%
OMXN40	135	18,1%	160	15,1%	295	16,3%
CAC40	143	19,2%	220	20,7%	363	20,1%
DAX30	62	8,3%	114	10,7%	176	9,7%
IBEX35	56	7,5%	30	2,8%	86	4,8%
S&P MIB40	88	11,8%	78	7,3%	166	9,2%
AEX25	66	8,9%	89	8,4%	155	8,6%
YHTEENSÄ	**745**	100,0%	**1063**	100,0%	**1808**	100,0%

2) Coincident rating events controlled

	UPGRADE		DOWNGRADE		TOTAL	
FTSE100	150	30,1%	277	36,0%	427	33,68 %
OMXN40	82	16,4%	117	15,2%	199	15,69 %
CAC40	93	18,6%	161	20,9%	254	20,03 %
DAX30	41	8,2%	79	10,3%	120	9,46 %
IBEX35	36	7,2%	26	3,4%	62	4,89 %
S&P MIB40	48	9,6%	52	6,8%	100	7,89 %
AEX25	49	9,8%	57	7,4%	106	8,36 %
YHTEENSÄ	**499**	100,0%	**769**	100,0%	**1268**	100,00 %
	-33,02 %		-27,32 %		-29,87 %	

3) Final sample

	UPGRADE		DOWNGRADE		TOTAL	
FTSE100	149	30,7%	261	37,1%	410	34,5%
OMXN40	81	16,7%	111	15,8%	192	16,1%
CAC40	89	18,3%	140	19,9%	229	19,2%
DAX30	39	8,0%	70	9,9%	109	9,2%
IBEX35	36	7,4%	27	3,8%	63	5,3%
S&P MIB40	43	8,8%	40	5,7%	83	7,0%
AEX25	49	10,1%	55	7,8%	104	8,7%
YHTEENSÄ	**486**	100,00 %	**704**	100,00 %	**1190**	100,00 %
	-2,61 %		-8,45 %		-6,15 %	

Figure 11. Derivation of the sample of credit rating announcements between 1990 and 2007.

Each rating change (issue) for a company (issuer) resulted in only one sample observation, regardless of the number of bonds affected. To overcome a problem of event date clustering, in case multiple rating changes took place for single issuer on the same day, only one rating change was recorded.

In case coincident events occurred on the same day, they were preferred according to the following criteria; 1) The number of bonds experiencing identical change, 2) Seniority of the bond, 3) Largest magnitude of change, and finally 4) a change by Moody's or Standard & Poor's was preferred before Fitch. Another restriction regarding the sample was that only bonds with stock price both before and after the announcement date were included.

4.2 DESCRIPTIVE STATISTICS

The following sub-chapter familiarises the reader with the data by presenting it in several different tables. These tables include the distribution of changes over time (See Table 3),

across rating agencies (See Table 4), the magnitude of rating changes (See Table 5), and the industrial classification of companies under the study (See Table 6). It should be noted that these tables represent the sample as a whole, excluding industrial classification which is further divided into country-specific level. Similar country-specific tables for other descriptive statistics can be found in Appendix 4.

4.2.1 Distribution over time

Table 3 Distribution of bond rating changes over time (full sample)

Year	Number of Upgrades	%	Number of Downgrades	%	Number of Bond rating Changes	%	Cumulative
1990	1	0,2 %	6	0,9 %	7	0,6 %	0,6 %
1991	3	0,6 %	15	2,1 %	18	1,5 %	2,1 %
1992	3	0,6 %	26	3,7 %	29	2,4 %	4,5 %
1993	12	2,5 %	18	2,6 %	30	2,5 %	7,1 %
1994	4	0,8 %	4	0,6 %	8	0,7 %	7,7 %
1995	9	1,9 %	11	1,6 %	20	1,7 %	9,4 %
1996	12	2,5 %	16	2,3 %	28	2,4 %	11,8 %
1997	16	3,3 %	18	2,6 %	34	2,9 %	14,6 %
1998	13	2,7 %	14	2,0 %	27	2,3 %	16,9 %
1999	33	6,8 %	37	5,3 %	70	5,9 %	22,8 %
2000	38	7,8 %	52	7,4 %	90	7,6 %	30,3 %
2001	33	6,8 %	109	15,5 %	142	11,9 %	42,3 %
2002	22	4,5 %	101	14,3 %	123	10,3 %	52,6 %
2003	30	6,2 %	87	12,4 %	117	9,8 %	62,4 %
2004	53	10,9 %	51	7,2 %	104	8,7 %	71,2 %
2005	60	12,3 %	40	5,7 %	100	8,4 %	79,6 %
2006	66	13,6 %	55	7,8 %	121	10,2 %	89,7 %
2007	78	16,0 %	44	6,3 %	122	10,3 %	100 %
	486	100 %	**704**	100 %	**1190**	100 %	

Table 3 presents the distribution of rating changes over time from 1990 to 2007. There are some clear patterns to be seen relating to the historical developments of the European markets, like a high number of downgrades during the recession in the early 1990's. From 1994 until 2000 the number of upgrades and downgrades are quite even in percentage terms, except that the number of upgrades increases moderately more during the dotcom era, from 1999 to 2001. Possibly the most obvious pattern is the large number of downgrades following the dotcom period trough 2001 to 2003. After the bubble had burst in 2001, many companies faced a rating downgrade due to lower investor confidence and harder market conditions. The telecommunications industry which stands out as one of the major sectors, especially measured by the number of companies in the industrial classification (See Table 6), faced a lot of downgrades during this period. The last four years from 2004 to 2007 show a constant growth in the number of upgrades following a strong stock market performance all over

Europe and the cumulative number of upgrades during these last four years is over 50 %. The signs of the recent sub prime crisis, which spread from the USA from fall 2006, have reached and affected the European market only partially and the full impact is yet to be seen. According to many analysts, an economic slowdown is inevitable also in Europe, perhaps embodying higher amount of downgrades for the coming years. Looking at the historical development, the credit rating changes seems to correlate very strongly with the stock markets and credit rating announcements seem to have a cyclical nature. An early 1990's recession was accompanied with downgrades, late 1990's dotcom era with high amount of upgrades, the post-dotcom era again with downgrades, followed by an upturn with upgrades, and finally a new economic slowdown and possible downgrades can be expected in the future.

4.2.2 Distribution across credit rating agencies

Table 4 presents the distribution of bond rating changes across all the major credit rating agencies during the period under review, including Moody's, Standard & Poor's and Fitch. It becomes evident from the table, that Moody's and S&P are by far the biggest and most active rating agencies in Europe, simply by examining the plain number of upgrades and downgrades. They cover over 85 % of the individual credit rating changes in the sample and actually present an identical number of total rating changes. Moody's controls the number of upgrades, whereas S&P records more downgrade changes. The number of observations and the scope in my study is too small to make prolonged conclusions, but it is apparent that issuers favour upgrades over downgrades, thus making Moody's look better when analysing table 4. Even though Fitch only corresponds to around 15 % of the rating changes in the sample, it is included in the study, since the majority of its credit rating changes have taken place during the last few years, making it important when valuating the phenomena in the recent past.

The ratio between upgrades and downgrades by a given rating agency is also distributed quite evenly across the sample, although downgrades seem to control the rating change announcements of S&P. The reason for this uneven distribution between upgrades and downgrades rises partially from the sheer fact that usually downgrades seem to have control over upgrades in the credit rating studies. All previous studies have also reported similar results, where the ratio between upgrades and downgrades is around 2/3, giving support to the fact that bond ratings seem to be more on the "downside", irrespective of the country or time.

This is interesting evidence, since the cyclical nature of rating business should indicate a more even ratio, but as table 4 suggests a similar ratio (0.69) can be found in my study as well.

Table 4. Distribution of bond rating changes across rating agencies (full sample)

Rating agency	Upgrades by Rating Agency	%	Downgrades by Rating Agency	%	Number of Changes by Rating Agency	%	Cumulative
MOO	223	45,9 %	284	40,3 %	507	42,6 %	42,6 %
S&P	183	37,7 %	324	46,0 %	507	42,6 %	85,2 %
FIT	80	16,5 %	96	13,6 %	176	14,8 %	100 %
	486	100 %	**704**	100 %	**1190**	100 %	

4.2.3 Magnitude of bond rating changes

Table 5 expresses the sample by the magnitude of bond rating change measured in notches. A notch is defined as an absolute value of difference in the cardinal scale (See Table 1) between the initial credit rating and the post-announcement credit rating. In case of downgrades, this difference is negative and therefore an absolute value of the difference is used, whereas the difference for upgrades is always positive. Thus, a magnitude of a rating downgrade e.g. from AA+ to AA- would be recorded as $|2-4| = 2$.

As table 5 proves, the sample mainly consists of changes of a small magnitude from one to three notches. The cumulative column in the table shows that 99 % of the observations experience a change with a maximum magnitude of five notches. A change of only one notch is by far the most common, covering over three quarters of the total changes, with changes of two and three notches covering 14.7 % and 4.5 %, respectively. There is no significant difference between the number of upgrade or downgrade changes measured in percentages, as both experience mainly small changes coupled with some extreme changes. Previous studies of the topic have also found that their samples are controlled by small changes, with some extreme changes taking place as well (See e.g. Jorion *et al*, 2005). Surprisingly, when analysing these different changes', extreme changes do not seem to cause stronger impact on stock market performance than moderate changes.

Under this evidence it is quite safe to say that credit rating changes are moderate while extreme upgrades or downgrades take place only in special cases, like Parmalat. It is also interesting that most of these extreme changes are recorded in the UK with BP, British Telecom and Northern Rock as issuers. These extreme rating changes indicate that agencies

have not been able to forecast the outlook of the issuer and its securities accurately and quickly enough, and therefore are forced to make a one-time adjustment, for what already seems to be a delayed announcement. However, if you use the number of extreme changes as a sole indicator of how accurate and useful rating agencies are, table 5 seems to speak for the agencies, since these extreme changes are highly unusual.

Table 5. Magnitude of bond rating changes measured in notches (full sample)

Magnitude of Change (Notches)	Number of Upgrades	%	Number of Downgrades	%	Number of Bond rating Changes	%	Cumulative
1	378	77,8 %	543	77,1 %	921	77,4 %	77,4 %
2	64	13,2 %	111	15,8 %	175	14,7 %	92,1 %
3	26	5,3 %	27	3,8 %	53	4,5 %	96,6 %
4	9	1,9 %	12	1,7 %	21	1,8 %	98,3 %
5	2	0,4 %	6	0,9 %	8	0,7 %	99,0 %
6	3	0,6 %	1	0,1 %	4	0,3 %	99,3 %
7	0	0,0 %	0	0,0 %	0	0,0 %	99,3 %
8	0	0,0 %	0	0,0 %	0	0,0 %	99,3 %
9	0	0,0 %	0	0,0 %	0	0,0 %	99,3 %
10	0	0,0 %	1	0,1 %	1	0,1 %	99,4 %
11	0	0,0 %	1	0,1 %	1	0,1 %	99,5 %
12	2	0,4 %	1	0,1 %	3	0,3 %	99,7 %
13	0	0,0 %	0	0,0 %	0	0,0 %	99,7 %
14	1	0,2 %	0	0,0 %	1	0,1 %	99,8 %
15	1	0,2 %	1	0,1 %	2	0,2 %	100 %
	486	100 %	**704**	100 %	**1190**	100 %	

4.2.4 Industrial classification of constituents

Finally, Table 6 represents the industrial classification of the companies and their bonds under the study. All seven countries are presented individually and a column summarizing the number of total companies and bonds, including their respective percentages can be found as well. In the last row of the table, a number of companies and bonds is also presented (bolded) both for individual countries and for total sample.

As discussed earlier, the sample companies are well diversified across all major industries and thus it is fair to assume that they give a vast and heterogeneous view of the given markets. Although the banking industry represents only around 10 % of the number of total companies, the number of bonds issued by banking industry represents a staggering 71,2 % of the total bonds issued by companies in the sample. This is the main reason why the beginning of the study was widely dedicated to familiarise the reader with the new Basel II accord and its projected implications on the banking industry in the future. Of course it should be noted, that the sheer number of bonds does not necessarily lead to a high number of credit rating

changes, but the amount of observations in this industry represents too big of an impact to be ignored. When the Financial Services industry is further added, and the joint coverage of these two industries is measured, one arrives to almost three quarters of the total number of bonds.

Every country has a unique industry composition and in addition to banking, they all have country-specific leading industries. The UK is led by financial services, broadcasting & publishing and utilities industries. The Nordic markets are driven by telecommunications and multi-industry, while France is led by energy sources, multi-industry and telecommunications. German markets on the other hand, are controlled by automobiles and utilities, whereas the index constituents in Spain, Italy and Netherlands mainly consist of telecommunications, utilities, insurance, food & household products, chemicals, and business & public services.

Table 6. Industrial classification of constituents (full sample)

INDUSTRIAL CLASSIFICATION		FTSE100			OMXN40			CAC40			DAX30			IBEX35			S&P MIB40			AEX25			TOTAL			
		Comp.	Bonds	%	Comp.	Bonds	%	Comp.	Bonds	%	Comp.	Bonds	%	Comp.	Bonds	%	Comp.	Bonds	%	Comp.	Bonds	%	Comp.	%	Bonds	%
1 Aerospace & Military Technology	AE	2	16	0,6 %													1	6	0,1 %				3	1,0 %	22	0,1 %
2 Appliances & Households	AP	1	15	0,5 %				3	19	0,4 %	1	253	3,0 %				1	2	0,0 %	1	44	4,6 %	7	2,2 %	333	1,2 %
3 Automobiles	AU				2	20	0,4 %	2	93	1,8 %	4	861	10,3 %				1	0	0,0 %				9	2,9 %	974	3,5 %
4 Building Materials & Components	BM	2	15	0,5 %	2	38	0,8 %	2	85	1,6 %				1	10	2,0 %	3	8	0,1 %				10	3,2 %	156	0,6 %
5 Broadcasting & Publishing	BR	8	108	3,9 %				1	53	1,0 %				3	0	0,0 %	4	4	0,1 %	2	13	1,3 %	18	5,7 %	178	0,6 %
6 Banking	CB	7	1223	43,7 %	6	3924	86,2 %	4	3668	71,1 %	3	5440	65,0 %	8	268	53,7 %	8	5255	96,5 %	1	3	0,3 %	37	11,8 %	19781	71,2 %
7 Construction & Housing	CE	2	1	0,0 %										4	4	0,8 %							6	1,9 %	5	0,0 %
8 Multi-Industry	CG	2	27	1,0 %	8	127	2,8 %	4	189	3,7 %				1	2	0,4 %	1	1	0,0 %				16	5,1 %	346	1,2 %
9 Chemicals	CH	2	46	1,6 %				1	6	0,1 %	2	123	1,5 %							2	71	7,3 %	7	2,2 %	246	0,9 %
10 Corporation	CO							1	14	0,3 %													1	0,3 %	14	0,1 %
11 Leisure & Tourism	EH	2	6	0,2 %				1	33	0,6 %	2	49	0,6 %	1	3	0,6 %	1	3	0,1 %				7	2,2 %	94	0,3 %
12 Electronic Components	EL	1	5	0,2 %	1	80	1,8 %	3	32	0,6 %	2	23	0,3 %				1	11	0,2 %	1	8	0,8 %	9	2,9 %	159	0,6 %
13 Energy Sources	EN	4	146	5,2 %	1	0	0,0 %	2	118	2,3 %				2	2	0,4 %	2	22	0,4 %	2	0	0,0 %	13	4,1 %	288	1,0 %
14 Beverages & Tobacco	FB	7	155	5,5 %	1	62	1,4 %	2	25	0,5 %				1	1	0,2 %	1	0	0,0 %	1	5	0,5 %	13	4,1 %	248	0,9 %
15 Financial Services	FI	15	435	15,6 %	2	67	1,5 %				5	142	1,7 %	1	0	0,0 %	1	11	0,2 %	3	213	22,0 %	27	8,6 %	868	3,1 %
16 Food & Household Products	FO	4	91	3,3 %				1	59	1,1 %										3	467	48,3 %	8	2,5 %	617	2,2 %
17 Sovereign Government - Agency	GA							1	313	6,1 %													1	0,3 %	313	1,1 %
18 Health & Personal Care	HC	3	11	0,4 %	1	0	0,0 %				2	9	0,1 %				1	1	0,0 %				7	2,2 %	21	0,1 %
19 Industrial Components	ID							2	6	0,1 %													2	0,6 %	6	0,0 %
20 Insurance	IS	3	23	0,8 %				2	53	1,0 %				1	5	1,0 %	5	8	0,1 %				11	3,5 %	89	0,3 %
21 Metals - Non Ferrous	MM	7	30	1,1 %	4	54	1,2 %	1	26	0,5 %	1	174	2,1 %	1	2	0,4 %				1	9	0,9 %	15	4,8 %	295	1,1 %
22 Machinery & Engineering	MY				2	23	0,5 %				1	0	0,0 %							1	10	1,0 %	4	1,3 %	33	0,1 %
23 Energy Equipment & Services	OQ																1	0	0,0 %				1	0,3 %	0	0,0 %
24 Business & Public Services	PV	8	43	1,5 %	1	8	0,2 %	1	81	1,6 %				3	10	2,0 %	1	2	0,0 %	4	80	8,3 %	18	5,7 %	224	0,8 %
25 Real Estate	RL	3	35	1,3 %							1	0	0,0 %	1	2	0,4 %							5	1,6 %	37	0,1 %
26 Merchandising	RQ	5	95	3,4 %				1	22	0,4 %	1	201	2,4 %										7	2,2 %	318	1,1 %
27 Data Processing & Reproduction	TC							1	5	0,1 %	1	8	0,1 %										2	0,6 %	13	0,0 %
28 Textiles & Apparel	TR				1	0	0,0 %							1	0	0,0 %							2	0,6 %	0	0,0 %
29 Telecommunications	TX	3	84	3,0 %	5	134	2,9 %	2	228	4,4 %	1	103	1,2 %	1	83	16,6 %	2	28	0,5 %	2	41	4,2 %	16	5,1 %	701	2,5 %
30 Utilities - Electrical & Gas	XV	8	165	5,9 %	2	17	0,4 %	2	33	0,6 %	2	932	11,1 %	6	107	21,4 %	4	79	1,5 %				24	7,6 %	1333	4,8 %
31 Transportation - Airlines	YA	2	15	0,5 %							1	52	0,6 %	1	0	0,0 %	1	2	0,0 %				5	1,6 %	69	0,2 %
32 Transportation - Shipping	YS	1	7	0,3 %	1	0	0,0 %													1	3	0,3 %	3	1,0 %	10	0,0 %
		102	**2796**	100 %	**40**	**4554**	100 %	**40**	**5161**	100 %	**30**	**8370**	100 %	**37**	**499**	100 %	**40**	**5443**	100 %	**25**	**967**	100 %	**314**	100 %	**27791**	100 %

4.2.5 Bond rating change matrix

Table 7 presents descriptive evidence in form of a rating migration matrix for the full sample of 1190 observations between January 1990 and October 2007. Panel A offers a matrix of the rating changes. Rows in Panel A represent old bond ratings and columns represent the new bond ratings after the change. The numbers in the cells represent the number of observations that have the respective old and new bond ratings, e.g. there are 67 upgrades from A to Aa. The diagonal of the matrix represents the changes within-class, for example from AA+ to AA, and the triangle underneath the diagonal captures upgrades whereas the triangle above the diagonal captures the downgrades.

Table 7. Bond rating change matrix (full sample)

This table presents descriptive evidence of the bond rating changes for the full sample of 1190 observations between 1990 and 2007. In Panel A, rows present old bond ratings and columns present new bond ratings, assigned by one of the major rating agencies. The diagonal of the matrix captures the within-class changes and the proportion of downgrades to total within-class rating changes is presented below the matrix. In Panel B, within or across class indicates whether the rating change occurs within gradations of the same letter class (e.g., BB+, BB, BB-) or across classes (e.g., AA to A). Across invesment grade indicates whether a bond is revised from invetment grade to speculative grade or vice versa.

Panel A: Bond rating change matrix

	Revised rating										
Prior rating	AAA/Aaa	AA/Aa	A/A	BBB/Baa	BB/Ba	B/B	CCC/Caa	CC/Ca	C	D	Total
AAA/Aaa	1	26	3	0	0	0	0	0	0	0	30
AA/Aa	17	125	120	4	0	1	1	0	0	0	268
A/A	1	67	316	109	2	2	0	0	0	0	497
BBB/Baa	0	3	78	188	17	2	0	0	0	0	288
BB/Ba	0	0	1	17	33	13	0	0	0	0	64
B/B	0	2	0	0	12	18	2	0	0	0	34
CCC/Caa	0	1	1	0	0	3	1	1	0	0	7
CC/Ca	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	2	2
D	0	0	0	0	0	0	0	0	0	0	0
	Proportion of "within class" rating changes which are downgrade (%)										1190
	0,0 %	54,4 %	64,6 %	54,8 %	42,4 %	55,6 %	0,0 %	0,0 %	0,0 %	0,0 %	

Panel B: Sample distribution by within class, across class and across investment grade

	Downgrades		Upgrades		Total	
	#	%	#	%	#	%
Within class	399	56,7 %	283	58,2 %	682	57,3 %
Across class	305	43,3 %	203	41,8 %	508	42,7 %
Across invest. Grade	21	3,0 %	22	4,5 %	43	3,6 %
Total	704	100 %	486	100 %	1190	100 %

Panel A also discloses the changes in the diagonal i.e. within-class, representing the percentage of rating changes that are downgrades. The number of changes within-class is slightly more prone towards downgrades, probably due to a higher amount of downgrades compared to upgrades in the sample. Another notion from Panel A is that a vast majority of across-class changes occur only within one class (within-one-class *upgrade* rating changes are on the diagonal right *below* the main light turquoise diagonal and *downgrade* rating changes right *above* the main diagonal), as could be expected after looking at table 5. In total, 95.6%

of the upgrade changes and 95.1% of the downgrade changes across-class are encountering a change of this magnitude. Panel B discloses the sample distribution within class, across class and across investment grade. As demonstrated by Panel B, the amount of changes within class and across class are quite evenly distributed between both downgrades and upgrades. This reinforces the assumption that the higher amount of within-class downgrades (seen in Table A) compared to upgrades is only attributable to the higher amount of downgrades. No reliable conclusion can be made as to whether downgrade changes are more prone to experience only changes within-class based on Table 7. Panel B also reports the changes across investment grade, which are only around 3 and 5 per cent for downgrades and upgrades, respectively.

4.3 METHODOLOGIES

Like virtually all event studies, I also use Cumulative Abnormal Returns (CAR's) as the main methodology to predict the stock price effect of a credit rating change. In addition, I also present corresponding values of Wilcoxon sign rank test for the given event periods. Since I have several different hypotheses, I use multiple different CAR's to capture the effect of different observations.

I have used a standard market model (See equation 1) to assess the stock market response of the studied companies to their individual credit rating changes:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad (1)$$

Where

R_{it} = Daily logarithmic return for stock i at time period t

R_{mt} = Daily logarithmic total return of market index

$\beta_i = \mathrm{COV}(R_{it}, R_{mt})/\mathrm{Var}(R_{mt})$

$\alpha_i = E(R_i) - \beta_i E(R_m)$, and

ε_{it} = Disturbance term of stock i on day t, where $E(\varepsilon_{it}) = 0$.

To estimate the abnormal performance of the companies under review, their respective estimates of $\hat{\alpha}_i$ and $\hat{\beta}_i$ are calculated primarily using a post-estimation window of t_{+31} to t_{+300}, or alternatively a pre-estimation window of t_{-300} to t_{-31} in cases there are less than 270 trading days available after the rating change announcement. The post-estimation window is preferred over the pre-estimation window, since both my data and most of the previous studies imply that downgrades (upgrades) tend to be preceded by other bad (good) news, and when the company's stock has been prone to weaker (stronger) growth than normally, thus causing a possible bias in the estimates.

Abnormal stock performance measures are developed by formulating daily prediction errors, AR_{it}, between t_{-300} and t_{+300}, defined as:

$$AR_{it} = R_{it} - (\hat{\alpha}_i - \hat{\beta}_i R_{mt}) . \qquad (2)$$

Abnormal return for each company is calculated from t_{-30} to t_{+30} and averaged across all companies on each of the 61 trading days to obtain daily mean abnormal returns (for all data upgrades $N = 486$ and for downgrades $N = 704$):

$$\overline{AR}_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \qquad (3)$$

And its variance is,

$$\text{var}(\overline{AR}_t) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma^2_{\varepsilon_{it}} . \qquad (4)$$

This sample variance $\sigma^2_{\varepsilon_{it}}$ is the sum of all the individual variances, each related to one single rating change and primarily measured from their respective post-estimation windows from t_{+31} to t_{+300}. In some instances a pre-estimation window has been used instead, for the same reason as in the case of estimating coefficients $\hat{\alpha}_i$ and $\hat{\beta}_i$ above.

The mean abnormal returns, $\overline{AR_t}$, are then aggregated over the event window (e.g. t_{-30} to t_{+30}) to obtain a cumulative mean abnormal return:

$$\overline{CAR}(t_{-30}, t_{+30}) = \sum_{t=t_{-30}}^{t+30} \overline{AR_t} \tag{5}$$

And its variance is,

$$\text{var}(\overline{CAR}(t_{-30}, t_{+30})) = \sum_{t=t_{-30}}^{t_{+30}} \text{var}(\overline{AR_t}) . \tag{6}$$

Using cumulative mean abnormal returns and their variances, hypothesis H_0 can be tested for different periods inside the event window:

$$H_0 = \frac{\overline{CAR}(t_{-30}, t+30)}{\text{var}(\overline{CAR}_{(t-30, t+30)}))^{1/2}} \sim N(0,1) \tag{7}$$

The other statistical test I am utilizing to answer to the research question is a non-parametric test statistic, Wilcoxon sign rank test. This test is usually used to create an appropriate non-parametric alternative, when two correlated samples fail to meet the assumptions of a t-test and in my study it is exercised to foster the statistical analysis. In all simplicity, the idea of the test is to investigate whether one of the samples prevails over another, i.e. whether there are statistically more positive abnormal stock returns over negative ones in a given time period.

The formula for the test is following:

$$Z = \frac{W^+ - \frac{N(N+1)}{4}}{\sqrt{\frac{N(N+1)(2N+1)}{24}}}. \tag{8}$$

Where

W^+= Sum of ranks belonging to positive abnormal returns

N = Number of observations

The following two formulas have been used in the analysis chapter to calculate t-test separately for daily and cumulative abnormal returns. A third *t*-test presented here, the independent *t*-test, was used to calculate the difference between the two sub samples in table 10. Equation (9) presents formula for calculating daily abnormal return, and equation (10) for calculating cumulative abnormal return, whereas equation (11) concludes methodological chapter by presenting independent *t*-test.

$$t = \sqrt{N}\frac{\overline{AR_t}}{\sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(AR_{it} - \overline{AR}_t)^2}} \tag{9}$$

$$t = \sqrt{N}\frac{\overline{CAR}_{km}}{\sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(\overline{CAR}_{ikm} - \overline{CAR}_{km})^2}} \tag{10}$$

Where

N = Number of observations in the sample.

AR_{it} = Abnormal return for issuer i at day t.

$\overline{AR}_t$ = Daily mean abnormal return at day t.

$\overline{CAR}_{ikm}$ = Cumulative mean abnormal return for issuer i between day t=k and day t=m.

$\overline{CAR}_{km}$ = Cumulative mean abnormal return between day t=k and day t=m.

Independent *t*-test was used to compare statistical significance of difference between the means of two sub samples on some other variable, when the two samples were independent of one another. The *t*-value I am finding is the difference between the two means divided by their sum of squares and taking the degrees of freedom into consideration.

The formula for the independent *t*-test is

$$t = \frac{\overline{CAR}_1 - \overline{CAR}_2}{\sqrt{\left(\frac{SS_1 + SS_2}{n_1 + n_2 - 2}\right)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \tag{11}$$

Where

$\overline{CAR_1}$ = Cumulative mean abnormal return for group 1.

$\overline{CAR_2}$ = Cumulative mean abnormal return for group 2.

SS_1 = Sum of squares for group 1. $\left(SS_1 = \sum \overline{CAR}_1^2 - \frac{\left(\sum \overline{CAR}_1\right)^2}{n_1} \right)$

SS_2 = Sum of squares for group 2. $\left(SS_2 = \sum \overline{CAR}_2^2 - \frac{\left(\sum \overline{CAR}_2\right)^2}{n_2} \right)$

n_1 = Number of observations in group 1.

n_2 = Number of observations in group 2.

5. ANALYSIS AND RESULTS

This chapter presents the main analysis and results of the study. The chapter is divided into sub-chapters, each answering to one of the hypotheses. All the following tables containing numerical data of CAR's are divided into three different announcement periods: Pre-announcement period ranging from t_{-30} to t_{-1}, announcement period including days t_0 and t_{+1}, and Post-announcement period ranging from t_{+2} to t_{+30}. It should be noted, that an announcement period is extended to contain two days (days t_0 and t_{+1}), since usually credit rating announcements are published after the markets have closed for the day and the actual impact in the stock market is expected to be revealed when the markets open on the following day.

5.1 INFORMATION CONTENT HYPOTHESIS

Information content hypothesis, which is the main hypothesis in my study, seems to support the findings of previous studies, as both the magnitude and significance of my analysis are presenting somewhat similar results. A downgrading of the credit rating seems to have a negative and highly significant impact on company's stock price performance, whereas upgrading the company's bond seems to account for a much more modest change, measured

by magnitude of the change and statistical significance. In fact, the signs of the CAR's in case of an upgrade seem to be negative in general and only vaguely positive after the announcement date (Day 0).

Table 8. The stock price response to bond Upgrades and Downgrades (full sample)

	Upgrades (*N* = 486)				Downgrades (*N* = 704)			
	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]
	[-30 to -1]	-0,0059	-1,52*	48,37	[-30 to -1]	-0,0173	-4,19***	48,39
Pre-announ.	[-30 to -21]	-0,0002	-0,10	49,14	[-30 to -21]	-0,0074	-3,07***	47,60
period	[-20 to -11]	-0,0038	-1,71**	48,70	[-20 to -11]	-0,0058	-2,41***	48,31
	[-10 to -1]	-0,0018	-0,82	47,28	[-10 to -1]	-0,0042	-1,77**	49,25
	[-5 to -1]	-0,0001	-0,04	47,78	[-5 to -1]	-0,0049	-2,91***	48,95
	[-3]	0,0011	1,60	49,38	[-3]	-0,0007	-0,93	49,01
	[-2]	-0,0012	-1,69*	46,71*	[-2]	-0,0009	-1,20	48,01
	[-1]	0,0004	0,55	47,94	[-1]	-0,0014	-1,80*	50,99
announ.	[0]	-0,0002	-0,24	49,79	[0]	-0,0036	-4,71***	50,14
period	[0 to +1]	0,0000	-0,04	49,28	[0 to +1]	-0,0059	-5,49***	48,30
	[+1]	0,0001	0,19	48,77	[+1]	-0,0023	-3,06***	46,45*
	[+2]	-0,0014	-2,05**	44,03**	[+2]	-0,0020	-2,62***	45,74*
	[+3]	0,0010	1,35	48,77	[+3]	-0,0013	-1,67*	49,43
	[+2 to +5]	-0,0005	-0,32	48,05	[+2 to +5]	-0,0008	-0,54	48,97
Post-announ.	[+2 to +10]	0,0019	0,90	48,31	[+2 to +10]	0,0016	0,69	49,13
period	[+11 to +20]	0,0004	0,16	48,85	[+11 to +20]	0,0014	0,60	49,45
	[+21 to +30]	-0,0003	-0,15	47,63	[+21 to +30]	-0,0007	-0,27	48,69
	[+2 to +30]	0,0021	0,54	48,28	[+2 to +30]	0,0000	0,01	49,00

Cumulative Abnormal Returns around different announcement periods of bond rating changes by all the major credit rating agencies from 1990 to 2007 are reported in Table 8. Announcements are divided into 1) pre-announcement, 2) announcement and 3) post- announcement periods, as well as into upgrades and downgrades. The number of observations in a given case is presented in parenthesis next to the type of announcement; i.e. upgrades, or downgrades. *, ** and *** denote statistical levels, which are significantly different from zero at 10%, 5%, or 1% levels, respectively. Superscripts a and b have the following meaning: [a] simple *t*-test statistic; [b] Wilcoxon sign rank test.

After looking at Table 8, it becomes evident that downgrades are statistically much more significant compared to upgrades. Downgrades appear to be negative and highly significant (at 1% -level) during pre-announcement and announcement period, whereas upgrades change their sign throughout the estimation window. The markets also seem to be efficient during downgrades, since CAR after the announcement [+2 to +30] is 0 % and all the impact already seems to be impounded into stock prices. The negative impact of a credit downgrade during pre-announcement period is -1.73% and a two-day announcement period return -0.6%, both statistically significant at 1% level.

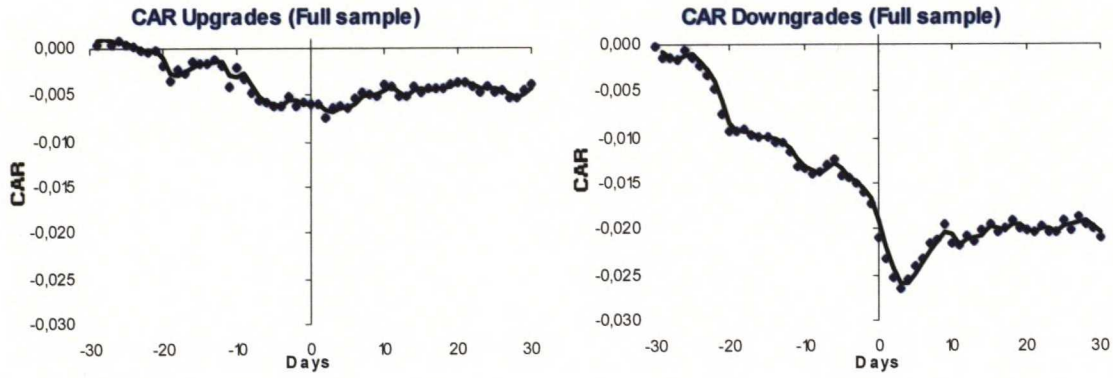

Figure 12. CAR's after rating Upgrade and Downgrade (Full sample)

Figure 12 shows that stock prices seem to experience a slight, though not statistically significant, "rebound" after rating downgrades, also stated in some earlier studies (See e.g. Steiner and Heinke, 2001). Probably the most logical explanation for this phenomenon was presented in a study by De Bondt and Thaler (1985) concerning the markets "overreaction" to unexpected or dramatic news events. This "overreaction" of the market is in contrast to the EMH, since if EMH holds, the information about the event should be incorporated into prices before or on the day of the event itself and there should be no impact on returns after the event. On the other hand, the CAR seems to settle down to the same level that that of the announcement day which indicates there is some noise in the markets during the announcement and this final level.

It also seems that credit rating announcements lag rather than lead the stock markets, as in the case of rating downgrades the pre-announcement period (Day -30 to -1) CAR's are significantly negative and constantly declining until the announcement date. It might be misleading to suggest that fosters the question of whether credit rating announcements truly possess new information content to the markets. However, it is quite safe to say that credit rating announcements simply possess more of a reactive, rather than proactive nature. One possible explanation for this question might be that usually bonds are assigned to a credit Watch list before a rating change and this assignment might cause investors to react to the deteriorating conditions before the actual credit rating announcement is disclosed. Numerous studies have found that bond's placement on negative Credit Watch List induces negative stock performance prior to actual rating change announcement (See e.g. Steiner and Heinke 2001, and Hand *et al.* 1992).

5.2. FURTHER ANALYSIS

I have used univariate testing and multiple regressions to analyse the impact of other variables that could affect the informational content of rating changes on stock prices. Univariate testing and multiple regressions with identical variables were also conducted on a country-specific level in order to drill deeper into the *nationality hypothesis*. These results are used to explain the changes in chapter 5.3. The variables possibly affecting the informational content of rating changes are presented in Table 9.

The first four variables, highlighted with light turquoise, formulate the main variables. The first variable is the magnitude of rating change (RCHG) which has a value of 1 if the size of the rating change is one notch, or a value of 2 if the magnitude of rating change is at least two notches. The second variable (ISSUER) distributes the sample into the rating changes of banks (1), or non-banks (2) and the third variable (AGENT) between agencies; Moody's (1), Standard & Poor's (2), or Fitch (3). The fourth variable is a dummy variable (SIZE) measuring whether the market value of the issuer is small or large, since some of the earlier studies discovered that the informational effect of rating change might vary across issuer's of different size (See e.g. Dichev and Piotroski, 2001). These four main variables constitute Model 1, presented later in a subchapter discussing of cross-sectional analysis.

In addition to these main variables, I have added a fifth variable that introduces the original rating (ORT), which measures whether the initial rating explains part of the informational effect and in particular, whether bonds with lower initial rating encounter stronger price reactions. The rest of the variables are dummy variables, specifying the level of original rating (ORT), and ranging from the highest ratings from AAA/Aaa to AA/Aa (DM1) to the lowest ratings from CCC/Caa to D (DM6). Jorion and Zhang (2005) discovered that a rating change in the lowest category led to a much greater abnormal return than the ones in the higher categories, since the risk of default is non-linear for rating categories. The original rating (ORT) and six dummy variables that relate to it together with a variable measuring the magnitude of rating change (RCHG) constitute Model 2, discussed later in the cross-sectional analysis.

Table 9. Definition of variables

Variable	Definition
RCHG,[1/≥2]	The absolute magnitude of rating change before/after the announcement, with a cardinal scale of 1 (AAA/Aaa) to 22 (D).
ISSUER,[1/2]	Variable with value 1 (2), if the issuer type is bank (non-bank).
AGENT,[1/2,3]	Variable with value 1 (2, 3), if the issuer is Moody's (S&P, Fitch).
SIZE,[1/0]	Dummy variable with value 1 (0), if the issuer's market value of equity is less (greater) than the sample mean.
ORT,[1 to 22]	Cardinal measure of original rating, starting from 1 (AAA/Aaa) to 22 (D).
DM1,[0/1]	Dummy variable with value 1, or 0 otherwise, if the ORT=1,2,3,4 (for ratings from AAA/Aaa to AA/Aa)
DM2,[0/1]	Dummy variable with value 1, or 0 otherwise, if the ORT=5,6,7 (for A)
DM3,[0/1]	Dummy variable with value 1, or 0 otherwise, if the ORT=8,9,10 (for BBB/Baa)
DM4,[0/1]	Dummy variable with value 1, or 0 otherwise, if the ORT=11,12,13 (for BB/Ba)
DM5,[0/1]	Dummy variable with value 1, or 0 otherwise, if the ORT=14,15,16 (for B)
DM6,[0/1]	Dummy variable with value 1, or 0 otherwise, if the ORT>16 (for ratings from CCC/Caa to D)

Most previous studies use the rating change across the investment grade threshold as one of the variables, but I decided to omit this variable since I only encountered a small number of such observations in my sample (See table 7). The other reason for omitting the variable was, that the study by Jorion and Zhang (2005) reveals that after taking into account the original rating (ORT), the impact of rating change across investment grade to speculative grade, or vice versa, does not possess the same explanatory power anymore.

5.2.1 Univariate testing of the hypotheses

First, an univariate testing is conducted to analyse the hypotheses individually by comparing different sub-samples of the main variables (RCHG, ISSUER, AGENT, and SIZE). Table 10 presents the results of mean sample abnormal returns (Panel A) and mean comparisons between different sub-samples (Panel B). Since there was no upgrade rating changes for banks (1) in the Netherlands, AEX had to be excluded from the overall calculations concerning banks (1) (ISSUER).

Table 10. Mean sample abnormal returns and mean comparisons

PANEL A: Mean sample abnormal returns

Variable	Window	Variable value	UPGRADES Mean	S.D.	t-Test[a]	DOWNGRADES Mean	S.D.	t-Test[a]
RCHG	$\overline{CAR}$ $t[0,1]$	1	-0,057	0,012	-0,39	-0,377	0,016	**-1,73****
		≥2	0,184	0,012	0,61	-1,299	0,023	**-1,58***
ISSUER	$\overline{CAR}$ $t[0,1]$	1	-0,155	0,012	-0,73	-0,885	0,018	**-1,84****
		2	0,104	0,013	0,62	-0,469	0,017	**-1,58***
AGENT	$\overline{CAR}$ $t[0,1]$	1	0,241	0,011	**1,46***	-0,322	0,015	-1,10
		2	-0,176	0,012	-0,54	-0,459	0,020	-1,18
		3	-0,289	0,014	-0,71	-1,809	0,014	**-1,84****
SIZE	$\overline{CAR}$ $t[0,1]$	1	0,046	0,012	0,25	-0,731	0,021	**-2,05****
		0	-0,094	0,011	-0,62	-0,272	0,013	**-1,42***

PANEL B: Mean comparisons of samples

Variable	Window	Value	UPGRADES N	ø-Diff.	t-Test[b]	DOWNGRADES N	ø-Diff.	t-Test[b]
RCHG	$\overline{CAR}$ $t[0,1]$	1/≥2	378/108	-0,241	-0,75	543/161	0,922	**1,53***
ISSUER	$\overline{CAR}$ $t[0,1]$	1/2	202/235	-0,260	-0,96	201/503	-0,417	-0,75
AGENT	$\overline{CAR}$ $t[0,1]$	1/2	223/183	0,417	**1,50***	284/324	0,137	0,28
		1/3	223/80	0,530	**1,45***	284/96	1,487	**1,96****
		2/3	183/80	0,113	0,25	324/96	1,350	**1,52***
SIZE	$\overline{CAR}$ $t[0,1]$	1/0	313/173	0,140	0,50	484/220	-0,459	-0,84

Table 10 presents mean sample abnormal returns (Panel A) and mean comparisons between samples (Panel B), which are further divided into upgrades and downgrades. The mean values of CAR's and their standard deviations (S.D.) are computed over the 2-day announcement period from day 0 to day 1. Column *N* discloses the number of observations in each variable sample and ø-Diff. denotes the difference between the mean CAR's of the two samples. AEX has been excluded from the calculations of bank (1) (ISSUER) mean abnormal returns and S.D. for upgrades (in Panel A), since no rating changes for banks occured during the period under review. [a] simple t-test statistic, [b] t-test for independent samples. ***, **, and * denote significance at 1%, 5% or 10% level, respectively.

As the results of *information content hypothesis* indicated, CAR's of the main variables during the announcement period look to be statistically significant only for downgrades (Panel A) and they do not possess a great deal of explanatory power for generally insignificant upgrade changes.

There are also some results in the table that seem contradict with expected results. In case of upgrade announcements some of the variables seem to encounter negative mean sample returns (Panel A), instead of expected positive ones. For upgrades, only rating changes of at least two notches (RCHG; ≥2), non-banks (ISSUER; 2), Moody's announcements (AGENT; 1), and small issuers (SIZE; 1) have the expected sign, and the stock price performance of all other variables seem to penalize the abnormal return. Looking at the magnitude of rating change (RCHG), it appears that bigger rating changes (RCHG; ≥2) seem to have the expected sign and possess much greater impact in the stock market; +0.18% and -1.30% for upgrades and downgrades respectively, though the change is not significant for upgrades. A variable

(ISSUER) dividing companies into banks (1) and non-banks (2) is statistically significant only for downgrades and the effect on abnormal returns is clearly stronger for banks, contrary to previous studies and my *issuer hypothesis*. Looking at the rating agencies (AGENT), for upgrades only Moody's has the expected sign and statistical significance, whereas for downgrades the announcements by Fitch clearly have the highest impact and significance on abnormal returns, which is casting a slight shadow over the *reliability hypothesis*. Finally, the size of the issuer (SIZE) is statistically significant only for downgrades and the impacts to small (1) and large (0) companies are -0.73% and -0.27% respectively. The results concerning the size of the issuer signal, that rating changes of small issuers are followed by greater and more expected stock price performance compared to large issuers, thus providing some evidence of different perception by stockholders among issuers of different size.

Panel B of table 10 presents mean comparisons between sample variables, as well as the number of observations within these samples. The difference in mean abnormal returns between the two samples measuring magnitude of rating change (RCHG) is large and significant only for downgrades, fortifying the notion that the markets seem to react differently to rating changes of different magnitude. The difference between banks and non-banks (ISSUER) is not significant for upgrades neither downgrades, which gives some indication of the results for *issuer hypothesis*. Results in Table 10 for variable testing the *reliability hypothesis* (AGENT) are divided into three sub-samples, Moody's (1), S&P (2), and Fitch (3). The differences between abnormal returns for downgrades seem to vary across rating agencies due to greater abnormal returns by Fitch, and the same holds for upgrades due to positive returns by Moody's, slightly contradicting the *reliability hypothesis*. Finally, the difference in abnormal returns between the size of the issuer is small and insignificant for both upgrades and downgrades, contrary to previous studies, which report some differences in market perception between issuers of a different calibre (See e.g. Dichev and Piotroski, 2001).

Similar country-specific calculations were also performed, but they are only attached as Appendix 5, since the number of observations for certain variables were quite small for some countries (IBEX, MIB and AEX). In some cases the differences between abnormal sample returns (in Panel B) might have been large, however, small number of observations ensure that the reliability and statistical significance remain low for those comparisons.

5.2.2 Cross-sectional analysis of excess stock returns.

The cross-sectional analysis of cumulative abnormal returns was done separately for upgrades and downgrades by estimating the following regression equation (Model 1):

$$\text{CAR } t[t_1,t_2]_i = \alpha_0 + \alpha_1 \text{ RCHG}_i + \alpha_2 \text{ ISSUER}_i + \alpha_3 \text{ AGENT}_i + \alpha_4 \text{ SIZE}_i + \varepsilon_i \quad (12)$$

Where α_n are the regression coefficients of variable n. As Table 11 shows, a similar regression (Model 2) with slightly modified variables was also used to analyse the impact of original rating (ORT) to the abnormal returns, as well as an overall regression (Model 3) including all the variables. Corresponding country-specific cross-sectional analysis was also performed, but as in the case of univariate testing, it is only attached as an appendix 6 due to low number of observations for some variables and countries.

Before going further with the results of the cross-sectional analysis, it has to be pointed out that adjusted R^2 and significance (F-stat.) levels are even lower than those of previous studies'. And more shockingly, the overall explanatory power of the regressions seems to be even more modest for downgrades than for upgrades, contrary to most of the previous studies. In a study conducted by Steiner and Heinke (2001) their similar regressions of downgrades explains between 1.8% and 4.4% of the variance, whereas Jorion et al. (2005) report adjusted R^2 levels of 4.78% and 0.64% for downgrades and upgrades, respectively. Hand et al. (1992) even find negative explanatory power in one of their equation.

Table 11. Regression tests on abnormal stock returns for Upgrades and Downgrades (full sample)

Table 11 presents the average coefficients and t-statistics (in parenthesis) of Upgrade and Downgrade changes from the daily estimation (between 1990 to 2007) of the following cross-sectional regressions:

Model 1: $CAR_i = \alpha_0 + \alpha_1 RCHG_i + \alpha_2 ISSUER_i + \alpha_3 AGENT_i + \alpha_4 SIZE_i + \varepsilon_i$

Model 2: $CAR_i = \alpha_0 + \alpha_1 RCHG_i + \alpha_5 ORT_i + \alpha_6 DM1_i + \alpha_7 DM2_i + \alpha_8 DM3_i + \alpha_9 DM4_i + \alpha_{10} DM5_i + \alpha_{11} DM6_i + \varepsilon_i$

Model 3: $CAR_i = \alpha_0 + \alpha_1 RCHG_i + \alpha_2 ISSUER_i + \alpha_3 AGENT_i + \alpha_4 SIZE_i + \alpha_5 ORT_i + \alpha_6 DM1_i + \alpha_7 DM2_i + \alpha_8 DM3_i + \alpha_9 DM4_i + \alpha_{10} DM5_i + \alpha_{11} DM6_i + \varepsilon_i$

Independent variables	Upgrades				Downgrades			
	Coefficient (*t*-stat.)				Coefficient (*t*-stat.)			
	Exp. sign	Model 1	Model 2	Model 3	Exp. sign	Model 1	Model 2	Model 3
INTERCEPT		-0,280	-0,895	-0,859		1,799	12,458	13,422
		(-0,40)	(-1,11)	(-0,93)		(1,17)	**(1,73*)**	**(1,86*)**
RCHG	+	0,233	0,129	0,138	-	-1,115	-1,305	-1,497
		(0,73)	(0,40)	(0,42)		**(-1,83*)**	**(-2,07**)**	**(-2,35**)**
ISSUER	+	0,276		0,305	-	0,394		0,889
		(1,01)		(0,99)		(0,70)		(1,46)
AGENT	+	-0,300		-0,268	-	-0,733		-0,635
		(-1,64)		(-1,46)		**(-1,96**)**		**(-1,68*)**
SIZE	+	0,102		0,115	-	-0,612		-0,346
		(0,36)		(0,39)		(-1,12)		(-0,61)
ORT	+		0,284	0,272	-		-0,399	-0,454
			(1,64)	(1,56)			(-1,36)	(-1,52)
DM1			0,000	0,000			-9,667	-10,303
			(n/a)	(n/a)			(-1,53)	(-1,62)
DM2			-1,070	-1,078			-9,273	-9,840
			(-1,78*)	**(-1,79*)**			(-1,63)	**(-1,71*)**
DM3			-2,032	-2,136			-8,749	-9,337
			(-1,99)**	**(-2,09**)**			**(-1,69*)**	**(-1,78*)**
DM4			-2,778	-2,904			-7,229	-7,742
			(-1,77*)	**(-1,85*)**			(-1,52)	(-1,62)
DM5			-1,837	-2,017			-3,505	-4,020
			(-0,89)	(-0,97)			(-0,76)	(-0,87)
DM6			-3,568	-3,680			0,000	0,000
			(-1,30)	(-1,34)			(n/a)	(n/a)
R^2 (%)		0,90	2,46	3,10		1,06	1,29	2,05
Adj. R^2 (%)		0,08	0,82	0,85		0,50	0,15	0,49
F-stat.		1,09	**1,72***	1,52		1,87	1,30	1,45
No. of obs.		486	486	486		704	704	704

CAR is the cumulative abnormal return over the 2-day announcement period (t_0 to t_{+1}); RCHG is the absolute magnitude of the rating change, where categorical bond ratings are converted into a cardinal variable measured on a 22-point scale (1 for rating AAA, 22 for rating D); ISSUER defines the the industry of the company; AGENT defines the rating agency; and SIZE concludes whether issuer is small or large measured by its market value. ORT captures the effect of original rating before the announcement and; DM1 to DM6 are dummy variables set equal to one, if the original rating is among the given rating category, and zero otherwise. R^2 denotes how much the variables explain from the overall variance of the regression and F-statistic concludes the overall significance of the regression. ***, **, and * denote significance at 1%, 5% or 10% level, respectively.

The variables of the multiple regressions in table 11 possess expected signs in general and appear to fortify some of the results found in the univariate analysis above. The main variables seem to explain upgrade changes very modestly compared to downgrade changes and there are no striking differences between the results of individual Models within upgrades or downgrades. Another notion is the sheer size of the coefficients between upgrades and downgrades; the coefficients for downgrade variables are fivefold on average compared to those of upgrades. This fosters again the image of more robust market reaction after rating downgrades compared to upgrades. Even though the signs of the main variables for upgrades are in line with expected ones, excluding the variable AGENT, the only statistically

significant variables are the dummy variables relating to original rating (ORT), which in turn has unexpected sign and size. For downgrades, only the magnitude of rating change (RCHG) and rating agency (AGENT) have statistically significant explanatory power in Model 1 and the importance of (ISSUER), found previously in univariate tests, does not seem to prevail in cross-sectional analysis anymore. The results of the size of the issuer in cross-sectional analyses indicate that the information content of credit rating changes is not dependable on the calibre of the issuer even for downgrades.

Results for model 2, introducing original rating (ORT) and the sub categories (DM1 to DM6), do not explain the abnormal return the similar way founded in previous study. Contrary to Jorion and Zhang (2005), mediocre rating categories (DM2, DM3, and DM4) seem to explain a major portion of abnormal returns for upgrade and downgrade changes and rating changes in more extreme categories count for smaller, and less significant reactions. In defence, I would like to point out that the most extreme category values (DM1 and DM6) were not always comparable due to weak size and significance or low number of observations. Although the sign for the ORT is as expected for upgrades, the signs for all the dummy variables are negative and an upgrade in the lowest category (DM6) causes a highest deviation from expected. Rating categories do not seem to possess the same characteristics for downgrades either, since though negative, the magnitude and significance of the coefficients steadily weakens as we move towards the lowest rating categories. The proposition by Jorion and Zhang (2005) of possible lower initial ratings of downgrades compared to upgrades does not hold either, since in my study downgrades possessed higher original ratings (ORT) compared to upgrades on average (See table 7). Looking at these values, it is quite safe to say that the explanatory power of these rating categories seems to have more of a bell-shaped, rather than a non-linear curve according to my results.

5.3. NATIONALITY HYPOTHESIS

The nationality hypothesis is aimed to answer the question, whether major European markets show a homogenous reaction towards rating changes, as expected, or whether the reaction depends on the country. My initial hypothesis presumes the market reaction to be homogenous in every country after a rating change announcement, i.e. the attitudes towards announcements do not possess serious country-specific factors. This chapter is divided into seven different sub-chapters, each focusing on one of the markets in my study. Country-specific appendices 5 (univariate testing) and 6 (cross-sectional analysis) have been used to some extent in explaining the changes, but I would like to stress that for certain countries and variables, the amount of observations is quite low and thus, too prolonged conclusions should be avoided. Figures from 13 to 19 present the data in graphical form and Table 12 contains numerical data.

5.3.1 The UK

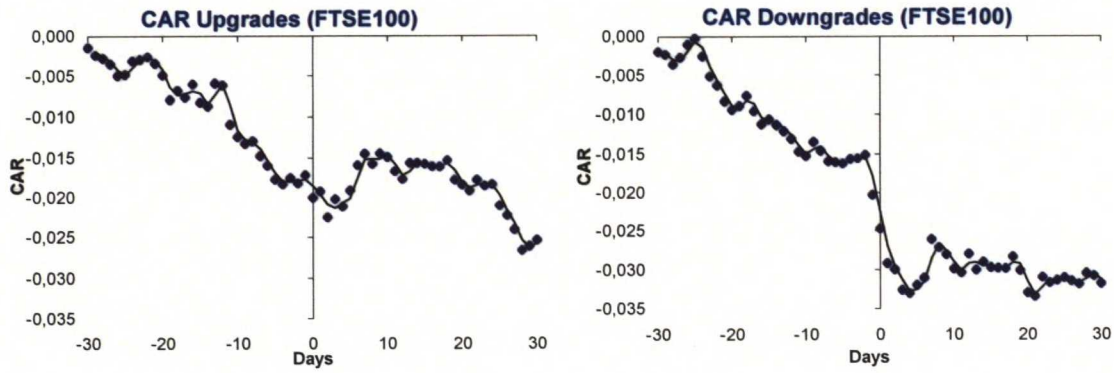

Figure 13. CAR's after rating Upgrade and Downgrade (FTSE100)

Looking at Figure 13 and table 12 concerning credit ratings for the FTSE constituents, only one striking defect seem to arise. In addition to highly negative and significant downgrade changes, upgrade rating changes also seem to witness negative, yet less significant abnormal returns, especially during the pre-announcement period. CAR's for downgrades during pre-announcement and announcement -periods are -2.0% and -0.9% respectively, both significant at 1%-level, and corresponding values for upgrades are -1.7% and -0.2%, though the latter is not statistically significant. Although negative, neither the variables in the country-specific mean abnormal returns (See Appendix 5), nor in the cross-sectional analysis (See Appendix 6) seem to explain this deviation from expected non-negative values for upgrades. For

downgrades, both ISSUER (bank) and AGENT (Fitch) seem to have a highlighted importance in explaining negative CAR's.

5.3.2 The Nordic markets

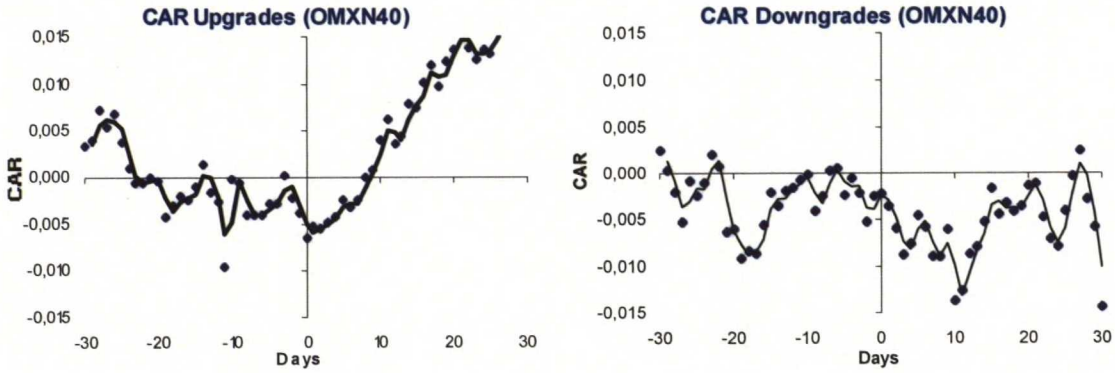

Figure 14. CAR's after rating Upgrade and Downgrade (OMXN40)

Next, shareholders of the OMXN constituents appear to value rating changes in a very different way. A positive reaction to an upgrade announcement emerges only after the announcement period and downgrade announcements are received without major decline in the stock market. The post-announcement period CAR for upgrades is +2.5% and significant, whereas the corresponding value for downgrades is -1.2%, consisting of vaguely significant negative and positive periods -1.0% [+2 to +10], +1.2% [+11 to +20] and -1.3% [+21 to 30]. Rating downgrades received by Nordic banks (-0.84%) are clearly much more negative and significant, than non-banks (+0.59%) and since the proportion of bank issuers to non-bank issuers is quite even (54/57) for downgrades, this might cause the somewhat unexpected values for downgrade announcements (See appendix 5).

5.3.3 France

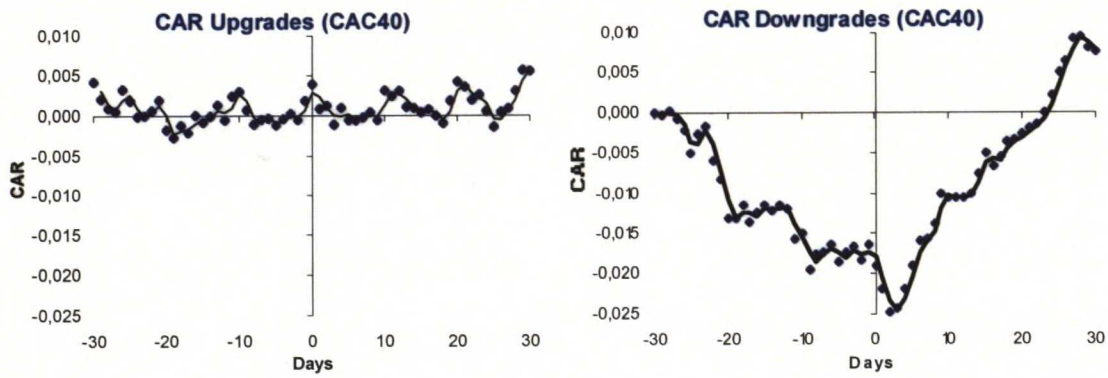

Figure 15. CAR's after rating Upgrade and Downgrade (CAC40)

Figure 15 and table 12 indicate that rating changes in France are received more or less the same way as most previous studies have found, with the exception that the "rebound effect" after a downgrade is clearly stronger compared to other countries. Upgrade changes are almost insignificant throughout the event window, but for downgrades, pre-announcement (-1.7%) and announcement (-0.5%) -period returns are negative and significant, whereas post-announcement (+2.7%) period undergoing a "rebound effect" is obviously positive and highly significant. One possible explanation for the stronger-than-usual "rebound effect" is, that many downgrade changes took place during the dotcom era (See appendix 4: Table 15; the distribution of bond rating changes over time), which could partly explain such a notable reversal immediately after rating downgrade.

5.3.4 Germany

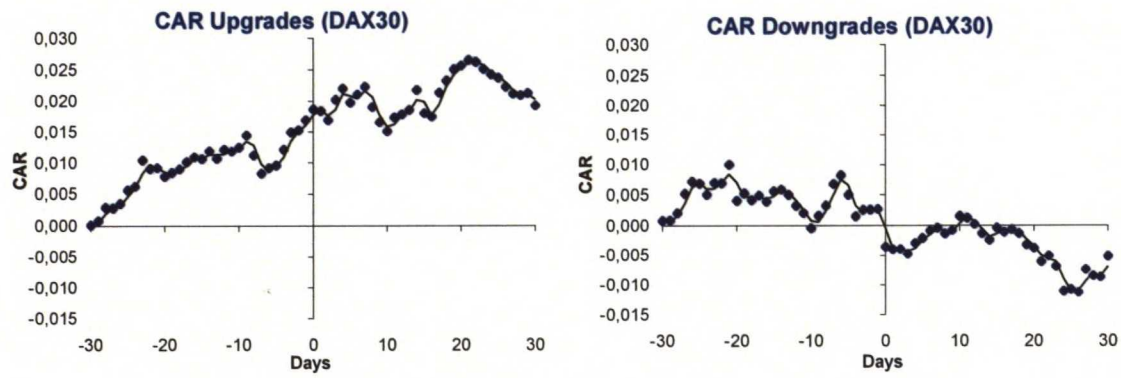

Figure 16. CAR's after rating Upgrade and Downgrade (DAX30)

As for German index constituents, upgrade changes are at least as strong and significant as downgrade changes, but I would like to stress the low number of observations obtained as upgrades (N = 39). The pre-announcement period return for upgrades is +1.7%, and although otherwise insignificant, the announcement period return (-0.7%) for downgrades is negative and highly significant. This fortifies the assumption that announcement period downgrades are almost without exception negative and significant. Appendix 5 reveals that abnormal returns after Moody's upgrade announcements (+0.99%) for German issuers are by far greater than corresponding S&P's (-0.03%), or Fitch's (-0.27%) and that they are at least partly expected to explain positive and significant upgrade changes.

5.3.5 Spain

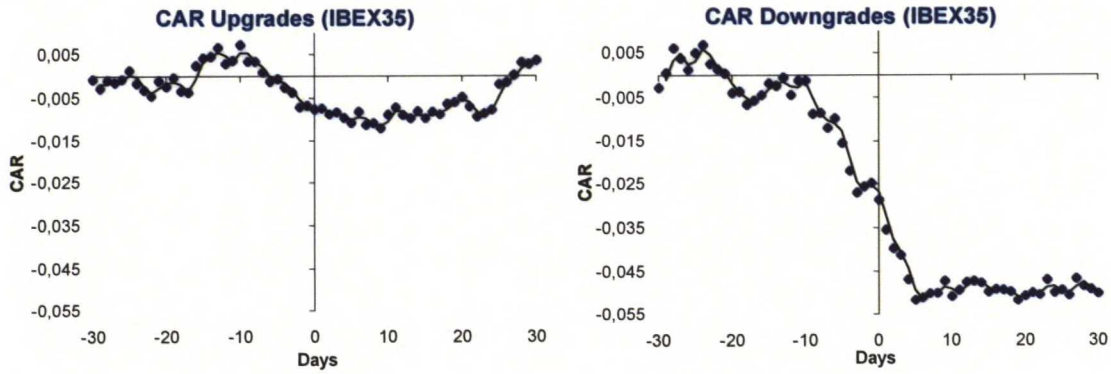

Figure 17. CAR's after rating Upgrade and Downgrade (IBEX35)

Spanish index constituents give insight to a more common stock market reaction to credit rating changes, but again I would like to stress the low number of observations for both upgrades (N= 36) and downgrades (N = 27). For upgrades, the CAR's seem fairly insignificant throughout the period, but for downgrades, pre-announcement (-2.5%), announcement (-1.1%) and post-announcement (-2.1%) -period returns are all negative and very significant. Moreover, the Spanish stock market is the only one not experiencing any kind of "rebound effect" after rating downgrades. Appendix 5 concludes that all the main variables (RCHG, ISSUER, AGENT and SIZE) seem to play a part in explaining negative abnormal returns after rating downgrades.

5.3.6 Italy

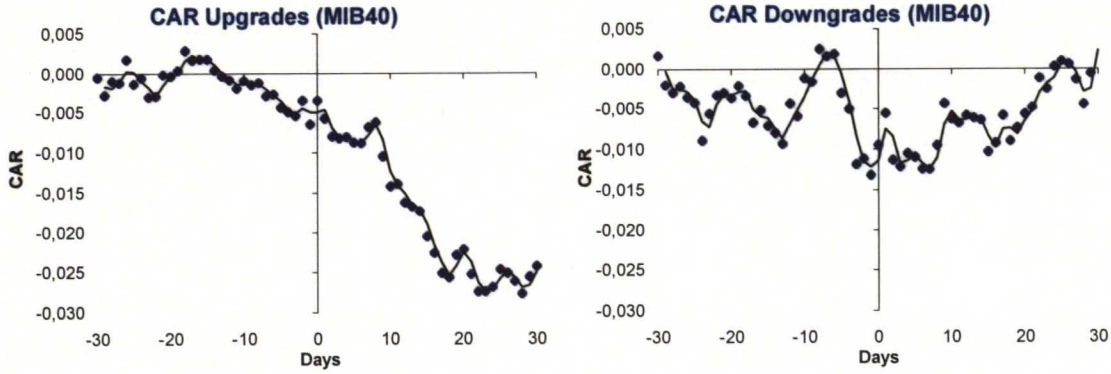

Figure 18. CAR's after rating Upgrade and Downgrade (MIB40)

Figure 18 and table 12 reveal that attitudes toward rating changes in the Italian markets appear to be the most unorthodox compared to other countries' peer groups. Upgrades are faced with negative abnormal returns throughout the whole event window (post-announcement period return is -2.1% and significant), excluding the positive and insignificant announcement period return (+0.3%). One possible explanation for negative upgrade returns rises again from the temporal placement of the announcements (See appendix 4: Table 15; the distribution of bond rating changes over time), since most of the upgrades take place during the sub prime crisis and declining stock markets. On the other hand, downgrades familiarized with negative abnormal returns, experience a highly significant positive CAR during the announcement period (+0.8%), strongly contradicting the hypotheses. This is likely to be a consequence of high number of bank's rating downgrades (See table 6) and their positive and highly significant announcement period return, 1.1% (See appendix 5).

5.3.7 The Netherlands

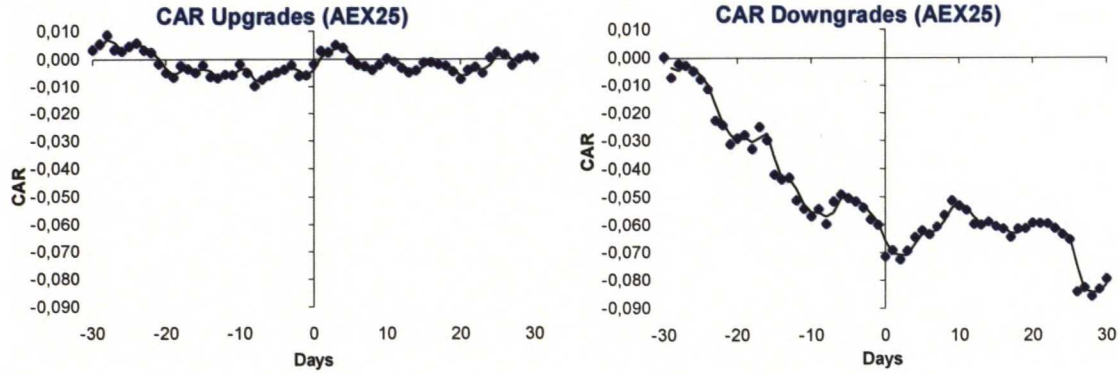

Figure 19. CAR's after rating Upgrade and Downgrade (AEX25)

The shareholders of the AEX constituents seem to react to rating changes in a similar fashion than most of the shareholders in other countries and previous studies expect. Upgrades are significant and positive only during the announcement period (+0.9%), and downgrades face more significant and far greater abnormal returns; highly significant pre-announcement (-6.0%), and announcement (-1.2%) -period returns and insignificant post-announcement (-0.8%) period return. The magnitude of rating change (RCHG) seems to have explanatory power in both upgrade and downgrade changes, and especially changes of at least two notches (RCHG ≥2) possess large abnormal returns for upgrades (+4.7%) and downgrades (-6.3%).

Even with my somewhat deviating country-specific results for upgrades and downgrades, I am reluctant to reject the *nationality hypothesis*. Although there are more unorthodox results for some countries, downgrades still seem to be more significant and possess greater abnormal returns than upgrades for almost every country. Moreover, all the downgrades excluding IBEX seem to possess a similar rebound effect derived from the "overreaction" bias, taking place in the markets after the announcement period. Further, if the countries with the most deviating results are excluded (i.e. the Nordic and Italian markets), the similarity of the results continues to increase. Logical extension to *nationality hypothesis* would be to test whether the most deviating markets possess characteristics or attitudes, which are clearly different from those of more mature markets.

Table 12. The country-specific stock price response to bond Upgrades and Downgrades

PANEL A: Upgrades		FTSE (*N* = 149)			OMXN (*N* = 81)			CAC (*N* = 89)			DAX (*N* = 39)			IBEX (*N* = 36)			MIB (*N* = 43)			AEX (*N* = 49)		
	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]
	[-30 to -1]	-0,0171	**-2,32*** **	48,48	-0,0039	-0,35	49,18	0,0018	0,22	49,03	0,0169	**1,74****	49,83	-0,0068	-0,67	47,59	-0,0065	-0,56	45,50	-0,0059	-0,45	47,48
Pre-announ.	[-30 to -21]	-0,0034	-0,81	49,06	0,0000	0,01	49,63	0,0019	0,40	48,65	0,0092	**1,64***	51,79	-0,0011	-0,19	49,72	-0,0002	-0,02	47,21	-0,0017	-0,22	48,57
period	[-20 to -11]	-0,0075	**-1,76****	48,19	-0,0095	**-1,47***	49,88	0,0005	0,10	49,78	0,0027	0,48	50,77	0,0047	0,79	50,83	-0,0018	-0,26	45,58	-0,0041	-0,54	45,92
	[-10 to -1]	-0,0062	**-1,46***	48,19	0,0056	0,87	48,02	-0,0006	-0,12	48,65	0,0051	0,91	46,92	-0,0104	**-1,76****	42,22	-0,0045	-0,68	43,72	-0,0001	-0,02	47,96
	[-5 to -1]	-0,0012	-0,39	48,32	0,0002	0,04	48,15	0,0021	0,64	50,56	0,0078	**1,97****	52,31	-0,0056	**-1,34***	38,89	-0,0038	-0,80	43,26	0,0000	0,00	47,35
	[-3]	0,0008	0,59	46,98	0,0030	1,48	49,38	0,0006	0,42	50,56	0,0028	1,58	56,41	-0,0011	-0,61	41,67	-0,0005	-0,24	53,49	0,0016	0,68	51,02
	[-2]	-0,0007	-0,48	46,31	-0,0024	-1,17	46,91	-0,0008	-0,50	53,93	0,0003	0,20	48,72	-0,0034	**-1,82***	**33,33****	0,0019	0,92	55,81	-0,0040	-1,63	**34,69****
	[-1]	0,0010	0,78	50,34	-0,0017	-0,81	46,91	0,0023	1,55	56,18	0,0017	0,94	51,28	0,0004	0,19	41,67	-0,0030	-1,42	**34,88****	0,0002	0,09	40,82
announ.	[0]	-0,0029	**-2,13****	49,66	-0,0025	-1,24	46,91	0,0021	1,37	**57,30***	0,0018	1,00	53,85	-0,0008	-0,44	38,89	0,0030	1,41	48,84	0,0041	**1,68***	46,94
period	[0 to +1]	-0,0021	-1,11	51,01	-0,0014	-0,50	47,53	-0,0010	-0,45	**48,88***	0,0015	0,59	48,72	-0,0006	-0,24	43,06	0,0007	0,24	52,33	0,0089	**2,59*****	50,00
	[+1]	0,0008	0,57	52,35	0,0011	0,53	48,15	-0,0030	**-2,01****	**40,45***	-0,0003	-0,17	43,59	0,0002	0,10	47,22	-0,0023	-1,08	55,81	0,0048	**1,98***	53,06
	[+2]	-0,0033	**-2,44****	**44,30****	-0,0002	-0,09	46,91	0,0004	0,24	49,44	-0,0015	-0,84	41,03	-0,0014	-0,74	33,33	-0,0023	-1,07	**37,21***	-0,0005	-0,22	44,90
	[+3]	0,0023	**1,72***	46,31	0,0007	0,32	53,09	-0,0023	-1,52	**46,07***	0,0034	**1,90***	51,28	0,0005	0,26	41,67	-0,0002	-0,10	51,16	0,0027	1,10	55,10
	[+2 to +5]	0,0001	0,04	48,15	0,0030	0,72	52,47	-0,0014	-0,47	48,31	0,0014	0,39	44,87	-0,0034	-0,90	45,14	-0,0030	-0,71	44,77	-0,0032	-0,66	47,45
Post-announ.	[+2 to +10]	0,0043	1,07	47,50	0,0093	**1,52***	52,13	0,0022	0,49	50,69	-0,0033	-0,62	45,58	-0,0015	-0,27	47,84	-0,0084	**-1,33***	42,64	-0,0026	-0,36	47,62
period	[+11 to +20]	-0,0035	-0,82	49,26	0,0095	**1,46***	51,23	0,0011	0,23	49,78	0,0106	**1,90****	50,51	0,0040	0,69	47,78	-0,0080	-1,20	40,70	-0,0077	-1,00	48,57
	[+21 to +30]	-0,0070	**-1,64***	45,50	0,0051	0,79	50,25	0,0014	0,29	50,56	-0,0065	-1,16	45,90	0,0085	**1,44***	49,44	-0,0021	-0,32	43,02	0,0078	1,01	48,57
	[+2 to +30]	-0,0054	-0,73	47,58	0,0250	**2,23****	51,07	0,0017	0,20	50,00	0,0005	0,06	47,26	0,0112	1,10	48,33	-0,0208	**-1,80****	42,56	0,0022	0,17	48,44

PANEL B: Downgrades		FTSE (*N* = 261)			OMXN (*N* = 111)			CAC (*N* = 140)			DAX (*N* = 70)			IBEX (*N* = 27)			MIB (*N* = 40)			AEX (*N* = 55)		
	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]
	[-30 to -1]	-0,0203	**-3,29*****	48,20	-0,0025	-0,18	48,68	-0,0166	**-1,84****	49,07	0,0027	0,26	47,81	-0,0248	**-1,86****	47,65	-0,0132	-1,06	48,17	-0,0599	**-3,26*****	48,18
Pre-announ.	[-30 to -21]	-0,0083	**-2,34*****	46,63	-0,0063	-0,78	48,11	-0,0083	**-1,60***	49,21	0,0100	**1,70****	49,00	0,0004	0,05	46,67	-0,0030	-0,42	47,25	-0,0313	**-2,95*****	46,00
period	[-20 to -11]	-0,0063	**-1,78****	47,97	0,0056	0,69	48,92	-0,0075	**-1,44***	48,14	-0,0079	**-1,35***	46,14	-0,0016	-0,21	49,26	-0,0029	-0,41	51,75	-0,0229	**-2,16****	48,91
	[-10 to -1]	-0,0057	**-1,58***	50,00	-0,0018	-0,22	49,01	-0,0008	-0,15	49,86	0,0006	0,11	48,29	-0,0236	**-3,06*****	47,04	-0,0072	-1,01	45,50	-0,0058	-0,54	49,64
	[-5 to -1]	-0,0043	**-1,71****	50,73	-0,0030	-0,53	48,11	0,0000	-0,01	49,43	-0,0055	**-1,33***	45,71	-0,0151	**-2,77*****	49,63	-0,0151	**-2,97*****	41,50	-0,0108	**-1,44***	50,18
	[-3]	0,0001	0,08	53,26	-0,0016	-0,64	44,14	0,0008	0,51	48,57	0,0011	0,59	54,29	-0,0050	**-2,06****	**40,74****	-0,0068	**-3,01*****	**32,50*****	-0,0022	-0,66	49,09
	[-2]	0,0004	0,37	47,51	-0,0031	-1,20	51,35	-0,0018	-1,08	50,71	0,0000	0,01	47,14	0,0014	0,56	62,96	0,0007	0,31	40,00	-0,0041	-1,23	**36,36****
	[-1]	-0,0052	**-4,63*****	**49,43***	0,0028	1,08	49,55	0,0019	1,14	55,71	0,0001	0,05	48,57	0,0008	0,33	51,85	-0,0020	-0,89	40,00	-0,0020	-0,58	60,00
announ.	[0]	-0,0044	**-3,90*****	49,81	0,0003	0,11	48,65	-0,0026	-1,56	52,14	-0,0063	**-3,37*****	**41,43****	-0,0039	-1,59	44,44	0,0036	1,61	60,00	-0,0116	**-3,45*****	56,36
period	[0 to +1]	-0,0089	**-5,55*****	48,47	-0,0011	-0,30	45,05	-0,0053	**-2,28*****	48,57	-0,0067	**-2,53*****	43,57	-0,0106	**-3,08*****	**38,89***	0,0076	**2,37*****	**61,25***	-0,0093	**-1,97****	54,55
	[+1]	-0,0045	**-3,96*****	47,13	-0,0014	-0,53	41,44	-0,0027	**-1,66***	45,00	-0,0004	-0,21	45,71	-0,0068	**-2,77*****	**33,33****	0,0040	**1,75***	**62,50***	0,0022	0,67	52,73
	[+2]	-0,0008	-0,67	46,36	-0,0024	-0,93	44,14	-0,0029	**-1,80***	47,14	0,0000	0,02	45,71	-0,0042	**-1,73***	**37,04****	-0,0058	**-2,56****	**40,00****	-0,0033	-0,98	50,91
	[+3]	-0,0026	**-2,34****	50,57	-0,0028	-1,09	45,95	0,0005	0,31	50,00	-0,0008	-0,44	**44,29***	-0,0015	-0,63	44,44	-0,0008	-0,36	52,50	0,0031	0,92	56,36
	[+2 to +5]	-0,0028	-1,22	49,33	-0,0010	-0,19	49,10	0,0028	0,84	49,29	0,0018	0,49	47,86	-0,0162	**-3,31*****	**36,11***	-0,0054	-1,20	49,38	0,0072	1,07	53,64
Post-announ.	[+2 to +10]	-0,0007	-0,20	49,55	-0,0101	**-1,32***	48,25	0,0113	**2,29*****	49,13	0,0055	0,98	48,73	-0,0153	**-2,09****	46,50	-0,0008	-0,11	47,22	0,0161	**1,60***	52,12
period	[+11 to +20]	-0,0031	-0,86	48,31	0,0123	**1,52***	52,25	0,0080	**1,54***	51,21	-0,0053	-0,91	46,00	0,0001	0,02	48,52	0,0006	0,09	47,25	-0,0061	-0,58	51,09
	[+21 to +30]	0,0012	0,32	49,89	-0,0130	**-1,61***	45,50	0,0103	**1,98****	50,79	-0,0014	-0,23	46,86	0,0005	0,07	46,67	0,0110	**1,63***	48,75	-0,0203	**-1,92****	47,45
	[+2 to +30]	-0,0070	-1,14	49,17	-0,0121	-0,87	48,44	0,0268	**2,98*****	50,24	-0,0016	-0,15	47,10	-0,0214	**-1,60***	46,79	0,0148	1,19	48,25	-0,0081	-0,44	50,24

Cumulative Abnormal Returns around different announcement periods from 1990 to 2007 are reported in Table 12. Announcements are divided into 1) pre-announcement, 2) announcement and 3) post-announcement periods. Panel A captures the effects of upgrades, whereas Panel B records downgrades. Further, the bond rating changes are divided among the countries in the study, i.e. UK, Nordic, France, Germany, Spain, Italy and Netherlands. The number of observations in a given case is presented in parenthesis next to the country-specific Index.*, ** and *** denote statistical levels, which are significantly different from zero at 10%, 5%, or 1% levels, respectively. Superscripts a and b have the following meaning: [a] simple *t*-test statistic; [b] Wilcoxon sign rank test.

5.4 RELIABILITY HYPOTHESIS

The reliability hypothesis aims to answer the question, whether the market reacts differently to announcements of different rating agencies, e.g. whether the price reaction is more robust after the announcement of Moody's or S&P, compared to that of Fitch. My initial hypothesis expects the market reaction to be indifferent of the rating agency, i.e. the rating announcements are perceived similarly by the markets across all the rating agencies. The chapter is further divided into three sub-chapters, each focusing on one of the rating agencies. Figures 20 to 22 present data in graphical form and Table 13 summarizes numerical the data.

5.4.1 Moody's

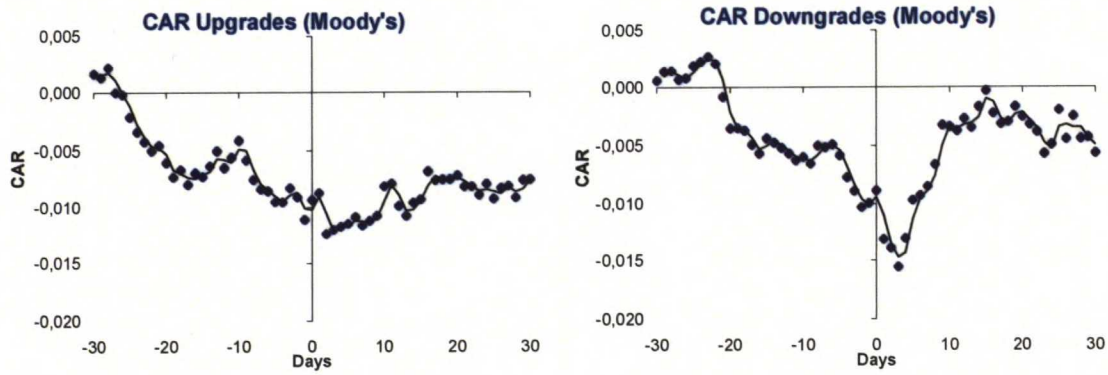

Figure 20. CAR's after rating Upgrade and Downgrade (Moody's)

After looking at the mean sample CAR for Moody's (Panel A) in Table 10, it is somewhat unexpected that the market reaction to upgrade announcements is so negative, since Moody's is the only rating agency reporting positive announcement day CAR (+0.24%) from all three. Although post-announcement period return is also positive (+0.2%), a negative and significant pre-announcement period (-1.1%) CAR for upgrades lead to a surprisingly low abnormal return during the event window. On the other hand, downgrade announcements adapt to more conservative abnormal return pattern with negative and significant pre-announcement (-0.99%) and announcement (-0.32%) -period returns, accentuated with extremely strong "rebound effect" (+0.97%) between trading days [+2 to +10].

5.4.2 Standard and Poor's

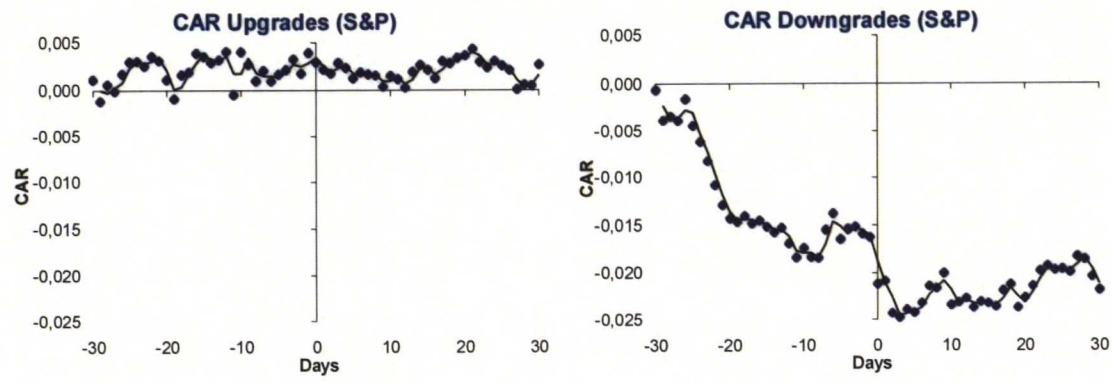

Figure 21. CAR's after rating Upgrade and Downgrade (S&P)

The market perception for Standard and Poor's rating announcements is almost completely insignificant for upgrades, but downgrades follow a more familiar-looking scheme again. For downgrades, negative and highly significant pre-announcement (-1.63%) and announcement (-0.46%) -period returns explain the whole information content of the downgrade, since post-announcement return is low (-0.06%) and insignificant. The "rebound effect" is present yet again, though weaker than for Moody's downgrades, as post-announcement abnormal return between trading days [+6 to +9] is (+0.42%).

5.4.3 Fitch

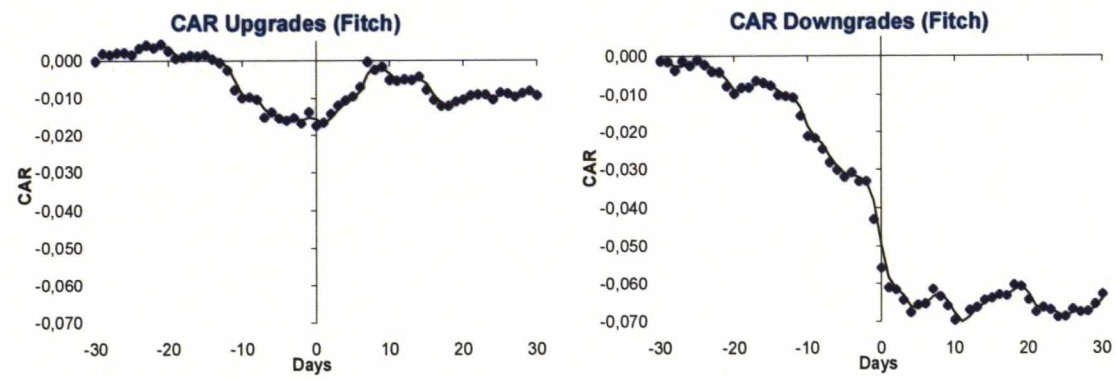

Figure 22. CAR's after rating Upgrade and Downgrade (Fitch)

In contrast to earlier beliefs, market reaction to Fitch's credit rating announcements appear to be strongest and most significant out of all the major rating agencies, despite the fact that the number of observations is clearly smaller for Fitch. CAR's for upgrades seem quite similar than that of the Moody's, as significant pre-announcement (-1.37%), and announcement (-

0.29%) -period returns precede the rating change. Positive market reaction seems to lag by a couple of days, as large and highly significant abnormal return (+1.14) places between trading days [+2 to +10]. For downgrades the results are most robust, as CAR's are extremely large and significant during pre-announcement (-4.29%), and announcement (-1.81%) -period, and almost all the informational content of rating change seem to have been absorbed into the stock prices before insignificant post-announcement (-0.71%) period return.

When comparing Moody's and Standard and Poor's rating announcements, it seems that Moody's announcements are stronger for upgrades and Standard and Poor's announcements for downgrades, which might partly be explained by the number of observations. Moody's and S&P disclose their rating announcements almost identically and since only one rating change was allowed to take place between trading days t_{-10} to t_{+10} (See chapter 4.1 Data), the rating agency disclosing its rating change announcement first, obviously encountered greater market reaction; for upgrades $N = 223$ (Moody's) vs. $N = 183$ (S&P), and for downgrades $N = 284$ (Moody's) vs. $N = 324$ (S&P). Fitch on the other hand, reported only $N = 80$ (upgrade) and $N = 96$ (downgrade) rating changes which all take place during the 21st century. Therefore, though greater and more significant, I believe that they are not completely comparable to rating change announcements by Moody's or Standard and Poor's. Another defect relating to Fitch's low number of rating changes is that deviating results, though controlled by excluding rating changes during extreme company-specific stock market events (See chapter 4.1 Data), possess much greater weight on the overall analysis and this could explain the difference in the magnitude of results. Keeping these results in mind, I am also reluctant to reject the *reliability hypothesis*, i.e. I believe abnormal stock returns are independent of rating agency.

Table 13. The rating agency-specific stock price response to bond Upgrades and Downgrades

PANEL A: Upgrades		MOO (*N* = 223)			S&P (*N* = 183)			FIT (*N* = 80)		
	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]
	[-30 to -1]	-0,0111	-1,96**	47,91	0,0039	0,56	49,13	-0,0137	-1,99**	47,96
Pre-announ.	[-30 to -21]	-0,0046	-1,40*	48,97	0,0031	0,77	49,45	0,0042	1,06	48,88
period	[-20 to -11]	-0,0010	-0,31	49,01	-0,0036	-0,90	49,89	-0,0120	-3,03***	45,13
	[-10 to -1]	-0,0055	-1,69**	45,74	0,0044	1,10	48,03	-0,0059	-1,49*	49,88
	[-5 to -1]	-0,0026	-1,13	46,10	0,0030	1,05	49,18	0,0001	0,02	49,25
	[-3]	0,0013	1,23	50,22	0,0011	0,87	49,18	0,0008	0,61	47,50
	[-2]	-0,0008	-0,79	47,98	-0,0015	-1,18	44,81	-0,0015	-1,20	47,50
	[-1]	-0,0020	-1,98**	41,26***	0,0022	1,71*	49,73	0,0031	2,45**	62,50**
announ.	[0]	0,0018	1,74*	52,47*	-0,0010	-0,79	45,36	-0,0037	-2,97***	52,50
period	[0 to +1]	0,0024	1,65**	50,45	-0,0018	-0,98	47,54	-0,0029	-1,63*	50,00
	[+1]	0,0006	0,60	48,43	-0,0008	-0,60	49,73	0,0008	0,67	47,50
	[+2]	-0,0037	-3,56***	38,12***	-0,0004	-0,32	48,63	0,0024	1,92*	50,00
	[+3]	0,0004	0,35	46,19	0,0011	0,87	50,82	0,0023	1,80*	51,25
	[+2 to +5]	-0,0028	-1,34*	45,63	-0,0009	-0,37	49,86	0,0071	2,82***	50,63
Post-announ.	[+2 to +10]	0,0006	0,19	47,43	-0,0007	-0,17	48,76	0,0114	3,04***	49,72
period	[+11 to +20]	0,0009	0,29	48,74	0,0021	0,53	50,05	-0,0053	-1,33*	46,38
	[+21 to +30]	-0,0003	-0,11	47,44	-0,0010	-0,24	48,25	0,0011	0,29	46,75
	[+2 to +30]	0,0018	0,32	47,91	-0,0003	-0,04	49,05	0,0082	1,19	47,54

PANEL B: Downgrades		MOO (*N* = 284)			S&P (*N* = 324)			FIT (*N* = 96)		
	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]
	[-30 to -1]	-0,0099	-1,46*	48,96	-0,0163	-2,59***	48,45	-0,0429	-5,02***	46,49
Pre-announ.	[-30 to -21]	-0,0008	-0,22	48,84	-0,0129	-3,57***	46,88	-0,0078	-1,58*	46,35
period	[-20 to -11]	-0,0054	-1,38*	48,42	-0,0054	-1,50*	48,86	-0,0079	-1,60*	46,15
	[-10 to -1]	-0,0037	-0,94	49,61	0,0021	0,58	49,60	-0,0272	-5,51***	46,98
	[-5 to -1]	-0,0050	-1,82**	49,86	-0,0025	-0,96	49,20	-0,0128	-3,67***	45,42
	[-3]	-0,0012	-0,95	46,83	0,0002	0,19	52,78	-0,0024	-1,55	42,71*
	[-2]	-0,0014	-1,17	46,83*	-0,0007	-0,64	48,15	0,0001	0,05	51,04
	[-1]	0,0004	0,30	53,87	-0,0004	-0,32	51,23	-0,0098	-6,29***	41,67**
announ.	[0]	0,0011	0,88	53,52	-0,0049	-4,29***	48,15	-0,0128	-8,18***	46,88
period	[0 to +1]	-0,0032	-1,84**	48,06	-0,0046	-2,83***	48,61	-0,0181	-8,18***	47,92
	[+1]	-0,0043	-3,48***	42,61**	0,0003	0,28	49,07	-0,0053	-3,39***	48,96
	[+2]	-0,0007	-0,60	47,18	-0,0035	-3,04***	44,75***	-0,0006	-0,38	44,79
	[+3]	-0,0017	-1,36	47,89	-0,0005	-0,40	48,77	-0,0027	-1,75*	56,25
	[+2 to +5]	0,0035	1,40*	49,47	-0,0034	-1,50*	48,61	-0,0046	-1,48*	48,70
Post-announ.	[+2 to +10]	0,0097	2,62***	49,61	-0,0026	-0,75	48,59	-0,0085	-1,82**	49,54
period	[+11 to +20]	0,0008	0,21	48,94	0,0008	0,22	49,44	0,0053	1,07	50,94
	[+21 to +30]	-0,0031	-0,78	47,78	0,0008	0,23	48,67	0,0014	0,29	51,46
	[+2 to +30]	0,0032	0,47	48,54	-0,0006	-0,10	48,92	-0,0071	-0,83	50,63

Cumulative Abnormal Returns around different announcement periods from 1990 to 2007 are reported in Table 13. Announcements are divided into 1) pre-announcement, 2) announcement and 3) post-announcement periods. Panel A captures the effects of upgrades, whereas Panel B records downgrades. Further, the bond rating changes are divided among the major credit rating agencies; Moody's, S&P and Fitch. The number of observations in a given case is presented next to agency abbreviation. *, ** and *** denote statistical levels, which are significantly different from zero at 10%, 5%, or 1% levels, respectively. Superscripts a and b have the following meaning: [a] simple *t*-test statistic; [b] Wilcoxon sign rank test.

5.5 ISSUER HYPOTHESIS

The issuer hypothesis tests whether reaction to credit rating change announcements is received differently among banks and non-banks. According to the initial hypothesis, I expected to receive statistically less significant price movements and weaker market reaction after a rating announcement of a bank, due to their more transparent and more regulated nature. This sub-chapter is further divided to separately discuss companies in the banking industry (5.4.1 Banks) and companies operating in other industries (5.4.2 Non-banks). Figures 23 and 24 capture the market response in graphical form, whereas statistical significance and numerical data is presented in Table 14.

5.5.1 Banks

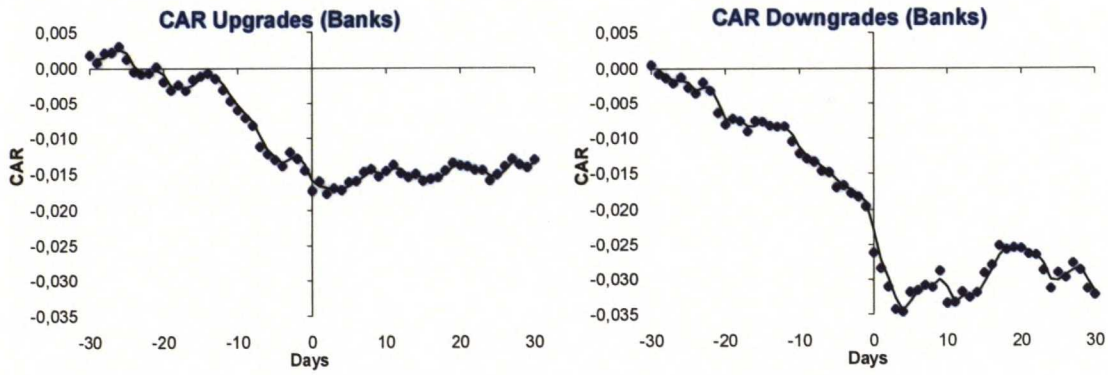

Figure 23. CAR's after rating Upgrade and Downgrade (Banks)

Contrary to my initial hypothesis, banks seem to be penalized for credit rating changes much more than other companies. Figure 23 and table 14 express how even upgrades are associated with negative and significant pre-announcement (-1.45%) and announcement (-0.28%) -period returns, and there are very few indications of a positive market reaction. It is very hard to come up with a reasonable explanation as to why upgrades are also experiencing such negative abnormal returns, and the number of observations in this case should also be large enough to exclude any possibility of outliers affecting the overall analysis (N = 202). If the analysis is further broken down to country-specific level, appendix 5 suggests that the negative announcement period impact of upgrades is especially prone to banks in the Nordic markets (-0.42%) and UK (-0.28%). Downgrades are even more negative and significant, as pre-announcement (-1.95%) and announcement (-0.89%) -period returns are followed by a significant rebound period of (+0.79%) between the only positive trading days [+11 to +20].

5.5.2 Non-banks

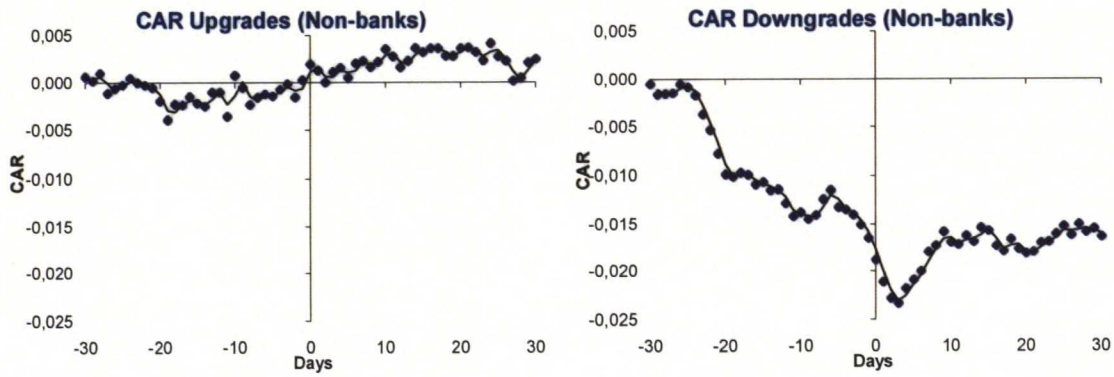

Figure 24. CAR's after rating Upgrade and Downgrade (Non-banks)

Despite negative abnormal returns for banks during upgrade changes, there is absolutely nothing to convince the reader of similar market reactions or attitudes of companies operating in industries other than banking. However, in case of non-banking companies, the announcement period returns have expected sign for both upgrades and downgrades (See table 14). Overall, upgrades for non-banking companies seem to be positive and growing but the only statistically significant changes are Wilcoxon sign rank tests around the announcement period. Downgrades in turn, appear to behave almost identically with the downgrades of all data, since the correlation between them is as high as $\rho = +0.91$ (See figure 12). Therefore, negative and significant pre-announcement (-1.65%) and announcement (-0.47%) -period returns are also in this case followed by a positive, yet insignificant (+0.42%), "rebound effect" between trading days [+2 to +10].

After looking at figures 23 and 24 and analysing table 14, it becomes evident that market reaction toward banks subject to credit rating changes is much stronger and more significant, compared to rating changes for non-banks. Although CAR's are also statistically significant for non-bank downgrades, the magnitude of abnormal returns banks encounter is much greater overall. Under the evidence provided in this sub-chapter, I have to reject the initial *issuer hypothesis*, i.e. price reaction is not statistically more significant for companies with less market follow up (non-banks).

Table 14. The issuer-specific stock price response to bond Upgrades and Downgrades

PANEL A: Upgrades		Bank (*N* = 202)			Non-bank (*N* = 284)		
	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]
	[-30 to -1]	-0,0145	**-2,78****	47,90	0,0003	0,04	48,71
Pre-announ.	[-30 to -21]	0,0002	0,06	49,36	-0,0005	-0,14	48,98
period	[-20 to -11]	-0,0048	**-1,60***	48,66	-0,0031	-0,81	48,73
	[-10 to -1]	-0,0099	**-3,28*****	45,69	0,0039	1,01	48,42
	[-5 to -1]	-0,0023	-1,06	45,94	0,0015	0,56	49,08
	[-3]	0,0019	**1,99****	50,99	0,0006	0,48	48,24
	[-2]	-0,0009	-0,92	45,54	-0,0014	-1,17	47,54
	[-1]	-0,0016	**-1,72***	**41,09****	0,0018	1,52	**52,82***
announ.	[0]	-0,0028	**-2,97*****	46,53	0,0017	1,42	52,11
period	[0 to +1]	-0,0016	-1,15	48,02	0,0010	0,61	50,18
	[+1]	0,0013	1,33	49,50	-0,0007	-0,56	48,24
	[+2]	-0,0017	**-1,75***	**43,56***	-0,0013	-1,06	**44,37****
	[+3]	0,0007	0,78	48,51	0,0011	0,92	48,94
	[+2 to +5]	0,0000	-0,03	48,14	-0,0007	-0,31	47,98
Post-announ.	[+2 to +10]	0,0014	0,50	46,48	0,0022	0,62	49,61
period	[+11 to +20]	0,0008	0,25	48,17	0,0001	0,02	49,33
	[+21 to +30]	0,0008	0,26	46,63	-0,0011	-0,30	48,35
	[+2 to +30]	0,0042	0,81	47,19	0,0005	0,08	49,05

PANEL B: Downgrades		Bank (*N* = 201)			Non-bank (*N* = 503)		
	$[t_1,t_2]$	CAR	t-Test[a]	% positive[b]	CAR	t-Test[a]	% positive[b]
	[-30 to -1]	-0,0195	**-3,46*****	48,47	-0,0165	**-1,92****	48,35
Pre-announ.	[-30 to -21]	-0,0064	**-1,95****	48,31	-0,0077	**-1,56***	47,32
period	[-20 to -11]	-0,0041	-1,27	48,96	-0,0064	**-1,29***	48,05
	[-10 to -1]	-0,0090	**-2,77*****	48,16	-0,0023	-0,47	49,68
	[-5 to -1]	-0,0047	**-2,04****	48,06	-0,0050	**-1,43***	49,30
	[-3]	-0,0011	-1,04	45,77	-0,0006	-0,35	50,30
	[-2]	-0,0005	-0,51	49,25	-0,0011	-0,68	**47,51***
	[-1]	-0,0013	-1,25	47,76	-0,0014	-0,89	52,29
announ.	[0]	-0,0066	**-6,42*****	46,77	-0,0023	-1,50	51,49
period	[0 to +1]	-0,0089	**-6,07*****	45,02	-0,0047	**-2,12****	49,60
	[+1]	-0,0022	**-2,17****	**43,28***	-0,0023	-1,49	47,71
	[+2]	-0,0027	**-2,63*****	45,27	-0,0017	-1,08	45,92
	[+3]	-0,0032	**-3,11*****	48,76	-0,0005	-0,31	49,70
	[+2 to +5]	-0,0035	**-1,68****	49,63	0,0002	0,08	48,71
Post-announ.	[+2 to +10]	-0,0050	**-1,63***	48,65	0,0042	0,90	49,33
period	[+11 to +20]	0,0079	**2,43*****	49,90	-0,0012	-0,24	49,26
	[+21 to +30]	-0,0067	**-2,06****	47,46	0,0018	0,36	49,18
	[+2 to +30]	-0,0061	-1,07	48,49	0,0025	0,29	49,20

Cumulative Abnormal Returns around different announcement periods from 1990 to 2007 are reported in Table 14. Announcements are divided into 1) pre-announcement, 2) announcement and 3) post-announcement periods. Panel A captures the effects of upgrades, whereas Panel B records downgrades. Further, the bond rating changes are divided into issuers in the banking industry and non-banking industries. The number of observations in a given case is presented in parenthesis next to industy-specific definition.*, ** and *** denote statistical levels, which are significantly different from zero at 10%, 5%, or 1% levels, respectively. Superscripts a and b have the following meaning: [a] simple *t*-test statistic; [b] Wilcoxon sign rank test.

6. SUMMARY AND CONCLUSIONS

This study examines daily stock market response to long-term issue-specific credit rating announcements, i.e. upgrades or downgrades. By using daily data I hope to decrease the probability that the stock price response is attributable to information other than the rating change announcement. My comprehensive sample is comprised of 1190 rating change announcements, given by one of the major credit rating agencies in seven leading European markets between 1990 and 2007.

There are some inconsistencies concerning different rating reclassification types, which are similar to those found in previous studies conducted with US data. I find asymmetric results for upgrades and downgrades, measured by mean cumulative abnormal stock returns (CAR). The empirical evidence indicates that rating downgrades induce negative and highly significant cumulative abnormal returns during the announcement period. Downgrade announcements are clearly viewed by investors as providing new information, since negative and significant returns are observed for full sample, as well as for any sub samples (excluding S&P MIB40). Moreover, downgrades seem to be most significant during the announcement period itself.

Bond upgrades, however, do not encounter corresponding positive and significant returns, and seem to provide a less robust market response in general. Upgrade stock returns are inherent to experience constant fluctuation in the stock market throughout the event window, and possess a considerably less significant nature compared to rating downgrades. In search for explanations, I conclude that either rating agencies truly seem to be "on the downside" by expending more resources to detect deteriorations in an issuer's financial position, or issuers themselves are biased to disclose good news, but not bad news, to the market.

Rating downgrades are associated with a positive, albeit in many cases insignificant, post-announcement period "rebound" effect between trading days [+2 to +10] and [+11 to +20]. As a result, CAR's are usually restored to their previous level introduced during the announcement period. Although investors are not able to profit on the long-run by acting based on announcement period information, this evidence of a "rebound" is clearly inconsistent with the Efficient Market Hypothesis, and is also facilitating some mild

possibilities for short-term arbitrage. A logical research topic would be to test whether this "rebound" is only present in the European markets, since prior studies based on US data have not found similar behaviour.

Cumulative abnormal returns were further analysed using several relevant variables to detect their influence on the overall analysis. These variables include ISSUER; measuring response between banks and non-banks, AGENT; measuring response across rating agencies, and SIZE; taking into account the magnitude of the issuer.

Some evidence in this paper seems to open new questions, as banks appear to encounter much greater price reaction compared to other companies' rating changes. This is somewhat unexpected since I hypothesized bank's abnormal returns to be weaker, attributable to higher monitoring and follow-up by regulators and other institutions. This evidence is extremely interesting since the forthcoming Basel II and especially its normative Internal ratings-based approach (IRB) further enhances banks position as credit risk mediators.

Secondly, there appear to be no reliable differences in market response across rating change announcements by major rating agencies, especially concerning that Fitch reports much fewer and only more recent rating announcements. Although market response to Fitch's rating changes appear most robust, announcements by Moody's and Standard and Poor also encounter a highly significant market response and the evidence is not strong enough to reject the hypothesis comparing market response across announcements of different rating agencies.

Finally, it appears that stock price response is not statistically greater for smaller issuers, compared to larger issuers. Although rating announcements were prone to experience a greater and more expected stock market response for smaller issuers, the evidence does not permit me to conclude statistically different market response by investors between issuers of different size. Further, the effect of the original rating (ORT) proposed in an earlier study, does not seem to explain the magnitude of abnormal return either.

Ultimately, I would like to stress that the main contribution of this paper lies in the possibility to draw conclusions on the European level as a whole, since this is an area yet to be explored. The nationality hypothesis suggests that the impact of rating reclassification is likely to be independent of the country. Although some European markets stood out with inconsistent

results, the prevailing conclusions were in-line with the overall results in general. A potential research question that emerges from this finding is, whether some smaller or less mature markets are associated with country-specific characteristics and attitudes, which are differentiating them from the more mature markets.

REFERENCES

Bachelier, L., (Paris: Gauthier-Villars 1900). "Théorie de la speculation", reprinted in English in: Cootner, P., (ed.) 1964. "The random character of stock market prices". Cambridge: M.I.T.

Bahar, R., and Nagpal, K., 2000. "Modelling the dynamics of rating transition". *Credit*, March, pp. 57-63,

Ball, R., and Brown, P., 1968. "An empirical evaluation of accounting income numbers". *Journal of Accounting Research*, 6 Autumn, pp. 159-78.

Bank for International Settlements, Basel Committee on Banking Supervision, 2000. "Credit ratings and complementary sources of credit quality information", Working Paper No 3, August.

Bank for International Settlements, Basel Committee on Banking Supervision, 2004. "International Convergence of Capital Measurement and Capital Standards: A revised framework", June 2004.

Bank for International Settlements, Basel Committee on Banking Supervision, 2001c, "The New Basel Capital Accord", Consultative Document (Basel: BIS).

Bank for International Settlements, Basel Committee on Banking Supervision, 2001d, "The Standardised Approach to Credit Risk", Consultative Document (Basel: BIS).

Bank for International Settlements, Basel Committee on Banking Supervision, 2001e, "The Internal Ratings-Based Approach", Consultative Document (Basel: BIS).

Barr, T.A., and McWhorter, R.P., 1992. "Understanding and strengthening bank credit culture". *The Journal of Commercial Lending*, April, pp. 6-11.

Brealey, R.A., Myers, S.C., and Allen, F., (2006). Credit risk, in international edition: Corporate Finance: 8th ed. (McGraw-Hill, New York.)

Brown, S.J., and Warner, J.B., 1985. "Using daily stock returns; The case of event studies". *Journal of Financial Economics* 14, pp. 3-31.

Cantor, R., and Packer, F., 1995. "The credit rating industry". *Journal of fixed income*, 5, December, pp. 10-34.

Conrad, J., and Kaul, G., 1988. "Time-variation in expected returns". *Journal of Business* 61, pp. 409-425.

De Bondt W.F.M., and Thaler R.H., 1985. "Does the stock market overreact?" *Journal of Finance* 40, pp. 793-805.

Dichev, I.D., and Piotroski, J.D., 2001. "The long-run stock returns following bond rating changes". *Journal of Finance* 56, pp. 173-204.

Ederington, L.H., Yawitz, J.B., and Roberts, B.E., 1987. "The informational content of bond ratings". *Journal of Financial Research* 10, pp. 211-226.

Ederington, L.H., and Goh, J.C., 1998. "Bond rating agencies and stock analysts: Who knows what when?" *Journal of Financial and Quantitative Analysis* 33, pp. 569-585.

Fama, E.F., 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work". *Journal of Finance* 25, pp. 383-417.

Fama, E.F., 1991. "Efficient Capital Markets: II". *Journal of Finance* 46, pp. 1575-1617.

Fama, E.F., 1998. "Market efficiency, long-term returns, and behavioural finance". *Journal of Financial Economics* 49, pp. 283-306.

Fama, E.F., Fisher, L., Jensen, M.C., and Roll R., 1969. "The adjustment of stock prices to new information". *International Economic Review* 10, pp. 1-21.

Figlewski, S., and White, L.J., 1995. "Orange County: Don't blame derivatives". *SternBusiness*, 1, Spring. pp. 30-5.

Fisher L., 1966. "Some new stock-market indexes". *Journal of Business* 39, pp. 191-225.

French K.R., and Roll R., 1986. "Stock return variances: The arrival of information and the reaction of traders". *Journal of Financial Economics* 17, pp. 5-26.

Goh, J.C., and Ederington, L.H., 1993. "Is a bond rating downgrade bad news, good news, or no news for stockholders?" *Journal of Finance* 48, pp. 2001-2008.

Griffin, P., and Sanvicente, A., 1982. "Common stock returns and rating changes: A methodological comparison". *Journal of Finance* 37, pp. 103-119.

Hand, J., Holthausen, R., and Leftwich, R., 1992. "The effect of bond rating agency announcements on bond and stock prices". *Journal of Finance* 57, pp. 733-752.

Holthausen, R.W., and Leftwich, R.W., 1986. "The effect of bond rating changes on common stock prices". *Journal of Financial Economics* 17, pp. 57-89.

Jorion, P., 1995. Big bets gone bad: Derivatives and bankruptcy in Orange County (San Diego: Academic Press).

Jorion, P., Liu, Z., and Shi, C., 2005. "Informational effects of regulation FD: evidence from rating agencies". *Journal of Financial Economics* 76, pp. 309-330.

Jorion, P., and Zhang, G., 2005. "Non-linear effects of bond rating changes". *Graduate School of Management, University of California at Irvine*, March 2005.

Keenan, S.C., 2000. "Special comment: Historical default rates of corporate bond issuers, 1920-1999". Moody's investor service.

Kendall, M.G., 1953. "The analysis of economic time series-Part I: Prices". *Journal of the Royal Statistical Society*, Series A (general) Vol. 116, No.1. pp. 11-34.

Kliger, D., and Sarig, O., 2000. "The information value of bond ratings". *Journal of Finance* 55, pp. 2879-2902.

Lo, A.W., and MacKinlay, A.C., 1988. "Stock market prices do not follow random walks: Evidence from a simple specification test". *Review of Financial Studies* 1, pp. 41-66.

MacKinlay, A.G., 1997. "Event studies in economics and finance". *Journal of Economic Literature* 35, pp. 13-39.

Neiderhoffer, V., and Osborne, M.F.M., 1966. "Market making and reversal on the stock exchange". *Journal of the American Statistical Association* 61, pp. 897-916.

Ong, M.K., 2003. Credit Ratings: Methodologies, rationale and default risk. Reprinted 2003. (Risk Waters Group, Great Britain).

Partnoy, F., 1999. "The Siskel and Ebert of financial market: two thumbs down for the credit rating agencies". *Washington University Law quarterly,* 77, 3 pp. 619-712.

Pinches, G.E., and Singleton, J.C., 1978. "The adjustment of stock prices to bond rating changes". *Journal of Finance* 33, pp. 29-44.

Scholes, M., 1972. "The market for securities: Substitution versus price pressure and the effects of information on share prices". *Journal of Business* 45, pp. 179-211.

Scholes, M., 1969. "A test of the Competitive Hypothesis: The market for new issues and secondary offerings". Unpublished Ph.D. Thesis, Graduate school of Business, University of Chicago.

Standard and Poor's, 2006. *Standard and Poor's ratings definitions*. S&P, New York, NY

Standard and Poor's, 2002. *Understanding credit ratings*. S&P, New York, NY.

Wakeman, L.M., 1990. "The real function of bond rating agencies", in C. Smith, ed: *The modern theory of corporate finance*, 2nd ed. (McGraw Hill, New York)

Wansley, J., and Terrence C., 1985. "The impact of credit watch placement on equity returns and bond prices". *Journal of Financial Research* 8, pp. 31-42.

Wild J.J., Subramanyam K.R., and Halsey R.F., International edition 2003. Financial statement analysis, 8th edition (McGraw-Hill, Singapore).

APPENDICES

A.1. SEC criteria for designating NRSROs.

Securities and Exchange Commission (SEC) criteria for designating NRSROs:

1. National recognition, which means that the rating organization is recognized as an issuer of credible and reliable ratings by the predominant users of securities ratings in the US.
2. Adequate staffing, financial resources and organizational structure to ensure that it can issue credible and reliable ratings of the debt of issuers, including the ability to operate independently of economic pressures or control by companies it rates and a sufficient number staff members qualified in terms of education and expertise to thoroughly and competently evaluate an issuer's credit.
3. Use of systematic rating procedures that are designed to ensure credible and accurate ratings.
4. Extent of contacts with the management of issuers, including access to senior level management of the issuers.
5. Internal procedures to prevent misuse of non-public information and compliance with these procedures.

A.2. **Minimum requirements to qualify for the foundation or advanced IRB approach.**

To be able to use the IRB approach a bank must demonstrate to its supervisor that it meets all the requisite minimum requirements. These requirements fall into nine broad categories, each relevant to a different aspect of the rating and risk measurement process. These categories, relevant both to the foundation and the advanced IRB approach, are:

1. Meaningful differentiation of credit risk;
    - Separate assessment of borrower (or counterparty) and transaction characteristics
    - A minimum of six to nine borrower grades for performing loans
    - A minimum of two grades for non-performing loans
    - No more than 30% of the gross exposures should fall in any single borrower grade
2. Completeness and integrity of rating assignments;
    - Each borrower must be assigned a rating before any loan is originated
    - Each separate legal entity should be separately rated
    - Independent review of each individual rating
    - Re-rating/review on at least an annual basis
    - Effective process to obtain and update relevant information
    - Procedure to update rating within 90 days; weak or deteriorating borrowers should be updated within 30 days
3. Oversight of the rating system and process;
    - All material aspects must be approved by the board of directors and the senior management
    - Ensure that the rating process, criteria and outcomes are comprehensively documented
    - Continuing review to ensure proper operation of the rating system
    - Review by internal and external auditors
    - Independent credit review function
4. Criteria of rating system;
    - Specific rating criteria for different classes and grades of borrowers
    - Conservative assessment of risk
    - Taking into account all relevant information
    - Variables used in a model must have statistical power and the model should capture all significant variables
5. Estimation of PD;
    - One-year PD
    - Use of regulatory reference definition of default
    - Documentation of mapping to external data
    - Documentation of the use of pooled data
    - Length of the underlying historical observation period used must be at least five years
6. Data collection and IT systems;
    - Collection of data in respect to the assignment of borrowers to grades and loss estimates associated with grades
    - Rating history
    - PD associated with rating grades
    - Migration of borrowers trough grades over time

- History of estimated PD and default rates
- Key borrower characteristics

7. Use on internal ratings;
    - Internal ratings and quantitative information as integral part of daily credit risk measurement
    - Internal rating's essential role in the credit approval process
    - Rating must be used within the pricing of credit risk
    - Setting of internal limits must be linked to internal ratings
    - Internal ratings must be considered in the process of reserving and stress-testing
    - Bank must demonstrate that it has been using a compliant rating system for at least three years
8. Internal validation; and
    - Robust system to validate accuracy and consistency of rating systems, processes and estimation of PD
    - Ongoing periodic monitoring of model performance
    - Periodic testing of model outputs against outcomes
    - Rigorous change control process
    - Banks must demonstrate that the quantitative testing methods and data are consistent over time
9. Disclosure requirements in support of Pillar 3: Market discipline
    - Disclosure requirements set out in Pillar 3
    - Failure to meet the minimum requirements will render banks ineligible to use the IRB approach

Additionally, there are three specific requirements for banks that intend to apply the advanced IRB approach:

10. Own estimates of LGD;
    - Banks must have several distinct LGD grades which provide for a meaningful differentiation of loss rates
    - Criteria for estimation and assignment of LGD grades
    - Minimum data observation period of at least seven years
    - Adequate consideration of collateral
11. Minimum requirements for use of own EAD estimates; and
    - A bank must assign an estimate of EAD for each facility. An estimate of EAD must be forward-looking, but must have some historical grounding
    - Criteria by which estimates of EAD are derived must be plausible and intuitive
    - Minimum data observation period of at least seven years
12. Minimum requirements for assessment of graduators and sellers of credit derivatives.
    - Both the borrower and the guarantor must be assigned a rating
    - Borrower's risk weight for the exposure may be substituted by the risk weight for the guarantor at its best
    - No restrictions with respect to possible guarantors

A.3. **Long-Term Issue Credit Ratings**

Issue credit ratings are based, in varying degrees, on the following considerations:

- Likelihood of payment—capacity and willingness of the obligor to meet its financial commitment on an obligation in accordance with the terms of the obligation;
- Nature of and provisions of the obligation;
- Protection afforded by, and relative position of, the obligation in the event of bankruptcy, reorganization, or other arrangement under the laws of bankruptcy and other laws affecting creditors' rights.

The issue rating definitions are expressed in terms of default risk. As such, they pertain to senior obligations of an entity. Junior obligations are typically rated lower than senior obligations, to reflect the lower priority in bankruptcy, as noted above. (Such differentiation applies when an entity has both senior and subordinated obligations, secured and unsecured obligations, or operating company and holding company obligations.) Accordingly, in the case of junior debt, the rating may not conform exactly with the category definition.

AAA
An obligation rated 'AAA' has the highest rating assigned by Standard & Poor's. The obligor's capacity to meet its financial commitment on the obligation is extremely strong.

AA
An obligation rated 'AA' differs from the highest-rated obligations only to a small degree. The obligor's capacity to meet its financial commitment on the obligation is very strong.

A
An obligation rated 'A' is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. However, the obligor's capacity to meet its financial commitment on the obligation is still strong.

BBB
An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation.

BB, B, CCC, CC, and C
Obligations rated 'BB', 'B', 'CCC', 'CC', and 'C' are regarded as having significant speculative characteristics. 'BB' indicates the least degree of speculation and 'C' the highest. While such obligations will likely have some quality and protective characteristics, these may be outweighed by large uncertainties or major exposures to adverse conditions.
BB
An obligation rated 'BB' is less vulnerable to nonpayment than other speculative issues. However, it faces major ongoing uncertainties or exposure to adverse business, financial, or economic conditions which could lead to the obligor's inadequate capacity to meet its financial commitment on the obligation.

B

An obligation rated 'B' is more vulnerable to nonpayment than obligations rated 'BB', but the obligor currently has the capacity to meet its financial commitment on the obligation. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitment on the obligation.

CCC
An obligation rated 'CCC' is currently vulnerable to nonpayment, and is dependent upon favorable business, financial, and economic conditions for the obligor to meet its financial commitment on the obligation. In the event of adverse business, financial, or economic conditions, the obligor is not likely to have the capacity to meet its financial commitment on the obligation.

CC
An obligation rated 'CC' is currently highly vulnerable to nonpayment.

C
A subordinated debt or preferred stock obligation rated 'C' is currently highly vulnerable to nonpayment. The 'C' rating may be used to cover a situation where a bankruptcy petition has been filed or similar action taken, but payments on this obligation are being continued. A 'C' also will be assigned to a preferred stock issue in arrears on dividends or sinking fund payments, but that is currently paying.

D
An obligation rated 'D' is in payment default. The 'D' rating category is used when payments on an obligation are not made on the date due even if the applicable grace period has not expired, unless Standard & Poor's believes that such payments will be made during such grace period. The 'D' rating also will be used upon the filing of a bankruptcy petition or the taking of a similar action if payments on an obligation are jeopardized.

Plus (+) or minus (-)
The ratings from 'AA' to 'CCC' may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the major rating categories.

NR
This indicates that no rating has been requested, that there is insufficient information on which to base a rating, or that Standard & Poor's does not rate a particular obligation as a matter of policy.

A.4. **Country-specific descriptive statistics.**

Table 15
The distribution of bond rating changes over time (full sample)

	FTSE100				OMXN40				CAC40				DAX30				IBEX35				MIB40				AEX25			
Year	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%
1990	1	0,7 %	3	1,1 %	0		2	1,8 %	0		0		0		0		0		0		0		0		0		1	1,8 %
1991	2	1,3 %	7	2,7 %	0		6	5,4 %	1	1,1 %	1	0,7 %	0		0		0		0		0		0		0		1	1,8 %
1992	2	1,3 %	14	5,4 %	1	1,2 %	9	8,1 %	0		1	0,7 %	0		0		0		0		0		1	2,5 %	0		1	1,8 %
1993	5	3,4 %	5	1,9 %	0		6	5,4 %	2	2,2 %	1	0,7 %	0		0		0		0		0		4	10,0 %	5	10,2 %	2	3,6 %
1994	1	0,7 %	3	1,1 %	1	1,2 %	0		0		1	0,7 %	0		0		0		0		0		0		2	4,1 %	0	
1995	4	2,7 %	2	0,8 %	3	3,7 %	1	0,9 %	1	1,1 %	6	4,3 %	0		0		0		1	3,7 %	0		1	2,5 %	1	2,0 %	0	
1996	6	4,0 %	7	2,7 %	1	1,2 %	3	2,7 %	2	2,2 %	4	2,9 %	0		1	1,4 %	0		0		0		0		3	6,1 %	1	1,8 %
1997	8	5,4 %	11	4,2 %	5	6,2 %	1	0,9 %	1	1,1 %	5	3,6 %	0		1	1,4 %	0		0		0		0		2	4,1 %	0	
1998	5	3,4 %	5	1,9 %	2	2,5 %	1	0,9 %	1	1,1 %	2	1,4 %	0		3	4,3 %	0		1	3,7 %	1	2,3 %	1	2,5 %	4	8,2 %	1	1,8 %
1999	11	7,4 %	13	5,0 %	6	7,4 %	6	5,4 %	12	13,5 %	13	9,3 %	0		2	2,9 %	2	5,6 %	0		2	4,7 %	1	2,5 %	0		2	3,6 %
2000	16	10,7 %	19	7,3 %	7	8,6 %	2	1,8 %	7	7,9 %	14	10,0 %	0		4	5,7 %	3	8,3 %	1	3,7 %	2	4,7 %	1	2,5 %	3	6,1 %	11	20,0 %
2001	12	8,1 %	30	11,5 %	12	14,8 %	20	18,0 %	5	5,6 %	33	23,6 %	1	2,6 %	9	12,9 %	0		4	14,8 %	2	4,7 %	5	12,5 %	1	2,0 %	8	14,5 %
2002	5	3,4 %	29	11,1 %	2	2,5 %	12	10,8 %	5	5,6 %	21	15,0 %	3	7,7 %	15	21,4 %	1	2,8 %	9	33,3 %	2	4,7 %	7	17,5 %	4	8,2 %	8	14,5 %
2003	8	5,4 %	39	14,9 %	6	7,4 %	10	9,0 %	4	4,5 %	10	7,1 %	3	7,7 %	12	17,1 %	4	11,1 %	2	7,4 %	2	4,7 %	4	10,0 %	3	6,1 %	10	18,2 %
2004	10	6,7 %	20	7,7 %	8	9,9 %	10	9,0 %	15	16,9 %	7	5,0 %	7	17,9 %	9	12,9 %	4	11,1 %	0		3	7,0 %	4	10,0 %	6	12,2 %	1	1,8 %
2005	11	7,4 %	14	5,4 %	10	12,3 %	7	6,3 %	17	19,1 %	6	4,3 %	6	15,4 %	3	4,3 %	2	5,6 %	3	11,1 %	8	18,6 %	5	12,5 %	6	12,2 %	2	3,6 %
2006	24	16,1 %	22	8,4 %	8	9,9 %	7	6,3 %	7	7,9 %	10	7,1 %	7	17,9 %	4	5,7 %	9	25,0 %	4	14,8 %	7	16,3 %	5	12,5 %	4	8,2 %	3	5,5 %
2007	18	12,1 %	18	6,9 %	9	11,1 %	8	7,2 %	9	10,1 %	5	3,6 %	12	30,8 %	7	10,0 %	11	30,6 %	2	7,4 %	14	32,6 %	1	2,5 %	5	10,2 %	3	5,5 %
	149	100 %	**261**	100 %	**81**	100 %	**111**	100 %	**89**	100 %	**140**	100 %	**39**	100 %	**70**	100 %	**36**	100 %	**27**	100 %	**43**	100 %	**40**	100 %	**49**	100 %	**55**	100 %

Table 16
The distribution of bond rating changes across rating agencies (full sample)

	FTSE100				OMXN40				CAC40				DAX30				IBEX35				MIB40				AEX25			
Agen.	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%
MOO	72	48,3 %	103	39,5 %	47	58,0 %	54	48,6 %	37	41,6 %	49	35,0 %	10	25,6 %	30	42,9 %	17	47,2 %	7	25,9 %	19	44,2 %	17	42,5 %	21	42,9 %	24	43,6 %
S&P	49	32,9 %	110	42,1 %	30	37,0 %	50	45,0 %	37	41,6 %	76	54,3 %	15	38,5 %	29	41,4 %	11	30,6 %	15	55,6 %	15	34,9 %	14	35,0 %	26	53,1 %	30	54,5 %
FIT	28	18,8 %	48	18,4 %	4	4,9 %	7	6,3 %	15	16,9 %	15	10,7 %	14	35,9 %	11	15,7 %	8	22,2 %	5	18,5 %	9	20,9 %	9	22,5 %	2	4,1 %	1	1,8 %
	149	100 %	**261**	100 %	**81**	100 %	**111**	100 %	**89**	100 %	**140**	100 %	**39**	100 %	**70**	100 %	**36**	100 %	**27**	100 %	**43**	100 %	**40**	100 %	**49**	100 %	**55**	100 %

Table 17

The Magnitude of bond rating changes measured in notches (full sample)

	FTSE100				OMXN40				CAC40				DAX30				IBEX35				MIB40				AEX25			
Notch	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%	UP	%	DOWN	%
1	109	73,2 %	205	78,5 %	63	77,8 %	74	66,7 %	73	82,0 %	116	82,9 %	30	76,9 %	49	70,0 %	27	75,0 %	24	88,9 %	34	79,1 %	36	90,0 %	42	85,7 %	39	70,9 %
2	19	12,8 %	40	15,3 %	14	17,3 %	32	28,8 %	11	12,4 %	16	11,4 %	5	12,8 %	11	15,7 %	7	19,4 %	2	7,4 %	5	11,6 %	3	7,5 %	3	6,1 %	7	12,7 %
3	10	6,7 %	9	3,4 %	3	3,7 %	4	3,6 %	5	5,6 %	4	2,9 %	0		5	7,1 %	1	2,8 %	0		4	9,3 %	1	2,5 %	3	6,1 %	4	7,3 %
4	4	2,7 %	4	1,5 %	1	1,2 %	1	0,9 %	0		1	0,7 %	2	5,1 %	2	2,9 %	1	2,8 %	1	3,7 %	0		0		1	2,0 %	3	5,5 %
5	1	0,7 %	1	0,4 %	0		0		0		1	0,7 %	1	2,6 %	2	2,9 %	0		0		0		0		0		2	3,6 %
6	2	1,3 %	1	0,4 %	0		0		0		0		1	2,6 %	0		0		0		0		0		0		0	
7	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
8	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
9	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
10	0		0		0		0		0		0		0		1	1,4 %	0		0		0		0		0		0	
11	0		0		0		0		0		1	0,7 %	0		0		0		0		0		0		0		0	
12	2	1,3 %	0		0		0		0		1	0,7 %	0		0		0		0		0		0		0		0	
13	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
14	1	0,7 %	0		0		0		0		0		0		0		0		0		0		0		0		0	
15	1	0,7 %	1	0,4 %	0		0		0		0		0		0		0		0		0		0		0		0	
	149	100 %	**261**	100 %	**81**	100 %	**111**	100 %	**89**	100 %	**140**	100 %	**39**	100 %	**70**	100 %	**36**	100 %	**27**	100 %	**43**	100 %	**40**	100 %	**49**	100 %	**55**	100 %

A.5. Country-specific mean sample abnormal returns and mean comparisons.

PANEL A1: UPGRADES

Mean sample abnormal returns

Variable	Window	Variable value	FTSE Mean	FTSE S.D.	FTSE *t*-Test	OMXN Mean	OMXN S.D.	OMXN *t*-Test	CAC Mean	CAC S.D.	CAC *t*-Test	DAX Mean	DAX S.D.	DAX *t*-Test	IBEX Mean	IBEX S.D.	IBEX *t*-Test	MIB Mean	MIB S.D.	MIB *t*-Test	AEX Mean	AEX S.D.	AEX *t*-Test
RCHG	$\overline{CAR}$ $t[0,1]$	1	-0,161	0,014	-0,43	-0,111	0,014	-0,30	-0,096	0,011	-0,40	0,259	0,008	0,81	-0,294	0,013	-0,82	-0,004	0,011	-0,02	0,244	0,012	0,56
		≥2	-0,345	0,010	-0,89	-0,264	0,012	-0,53	-0,097	0,013	-0,22	-0,223	0,009	-0,44	0,630	0,012	0,87	0,351	0,011	0,82	4,738	0,020	1,22
ISSUER	$\overline{CAR}$ $t[0,1]$	1	-0,276	0,018	-0,33	-0,424	0,014	-1,01	0,129	0,010	0,38	-0,098	0,009	-0,31	-0,098	0,011	-0,29	0,085	0,010	0,38	n/a	n/a	n/a
		2	-0,187	0,011	-0,71	0,356	0,012	0,84	-0,189	0,012	-0,71	0,381	0,008	0,87	0,084	0,018	0,09	-0,003	0,020	0,00	0,886	0,013	**1,39***
AGENT	$\overline{CAR}$ $t[0,1]$	1	0,192	0,013	0,53	0,175	0,012	0,46	-0,128	0,011	-0,35	0,993	0,009	**1,40***	0,397	0,012	0,93	0,665	0,009	**2,29****	0,332	0,010	0,82
		2	-0,342	0,010	-0,87	-0,730	0,016	-1,26	-0,382	0,012	-1,26	-0,031	0,007	-0,14	-0,964	0,008	**-1,49***	-0,400	0,015	-0,90	1,449	0,015	0,42
		3	-1,016	0,018	-0,94	0,489	0,010	1,02	0,687	0,012	**1,40***	-0,265	0,009	-0,50	0,199	0,020	0,26	-0,402	0,009	-0,90	-0,608	0,022	-0,41
SIZE	$\overline{CAR}$ $t[0,1]$	1	-0,182	0,014	-0,47	-0,107	0,015	-0,24	-0,095	0,012	-0,36	0,259	0,010	0,57	-0,224	0,012	-0,60	0,015	0,010	0,06	1,204	0,015	**1,42***
		0	-0,287	0,011	-0,83	-0,209	0,012	-0,58	-0,098	0,011	-0,29	0,017	0,007	0,07	0,191	0,014	0,32	0,155	0,014	0,38	0,007	0,008	0,01

PANEL B1: UPGRADES

Mean comparisons of samples

Variable	Window	Value	FTSE *N*	FTSE ∅-Diff.	FTSE *t*-Test	OMXN *N*	OMXN ∅-Diff.	OMXN *t*-Test	CAC *N*	CAC ∅-Diff.	CAC *t*-Test	DAX *N*	DAX ∅-Diff.	DAX *t*-Test	IBEX *N*	IBEX ∅-Diff.	IBEX *t*-Test	MIB *N*	MIB ∅-Diff.	MIB *t*-Test	AEX *N*	AEX ∅-Diff.	AEX *t*-Test
RCHG	$\overline{CAR}$ $t[0,1]$	1/≥2	109/40	0,183	0,27	63/18	0,153	0,21	73/16	0,001	0,00	30/9	0,482	0,75	27/9	-0,924	-1,26	34/9	-0,355	-0,66	42/7	-4,493	**-2,60*****
ISSUER	$\overline{CAR}$ $t[0,1]$	1/2	40/109	-0,089	-0,13	52/29	-0,780	-1,22	26/63	0,319	0,69	19/20	-0,480	-0,89	29/7	-0,182	-0,22	36/7	0,087	0,15	0/49	n/a	n/a
AGENT	$\overline{CAR}$ $t[0,1]$	1/2	72/49	0,535	0,99	47/30	0,905	**1,38***	37/37	0,255	0,54	10/15	1,024	**1,74****	17/11	1,362	**1,96****	19/15	1,065	**2,25****	21/26	-1,117	-0,83
		1/3	72/28	1,208	**1,38***	47/4	-0,314	-0,24	37/15	-0,814	**-1,28***	10/14	1,258	**1,52***	17/8	0,198	0,25	19/9	1,067	**2,29****	21/2	0,940	0,73
		2/3	49/28	0,673	0,70	30/4	-1,219	-0,77	37/15	-1,069	**-1,95****	15/14	0,234	0,43	11/8	-1,164	-1,24	15/9	0,002	0,00	26/2	2,057	0,48
SIZE	$\overline{CAR}$ $t[0,1]$	1/0	108/41	0,105	0,16	51/30	0,102	0,16	49/49	0,003	0,01	21/18	0,242	0,44	22/14	-0,415	-0,63	26/17	-0,140	-0,31	36/13	1,197	0,82

PANEL A2: DOWNGRADES

Mean sample abnormal returns

Variable	Window	Variable value	FTSE Mean	FTSE S.D.	FTSE *t*-Test	OMXN Mean	OMXN S.D.	OMXN *t*-Test	CAC Mean	CAC S.D.	CAC *t*-Test	DAX Mean	DAX S.D.	DAX *t*-Test	IBEX Mean	IBEX S.D.	IBEX *t*-Test	MIB Mean	MIB S.D.	MIB *t*-Test	AEX Mean	AEX S.D.	AEX *t*-Test
RCHG	$\overline{CAR}$ $t[0,1]$	1	-0,941	0,018	**-1,91****	-0,133	0,017	-0,29	-0,255	0,013	-0,84	-0,534	0,015	**-1,75****	-1,042	0,016	**-1,86****	0,833	0,014	**2,28****	1,255	0,018	**1,56***
		≥2	-0,689	0,025	-0,58	-0,059	0,020	-0,10	-1,849	0,021	-0,98	-0,975	0,014	-0,80	-1,248	0,013	-1,23	0,113	0,010	0,09	-6,261	0,057	-0,97
ISSUER	$\overline{CAR}$ $t[0,1]$	1	-4,169	0,030	**-1,43***	-0,841	0,021	**-1,79****	-0,270	0,011	-0,77	-0,528	0,014	**-1,94****	-0,409	0,020	-0,24	1,100	0,015	**2,52*****	-5,383	0,014	n/a
		2	-0,445	0,018	-1,26	0,586	0,016	1,11	-0,676	0,016	-1,11	-0,753	0,014	-1,13	-1,294	0,014	**-3,28*****	-0,258	0,009	-0,55	-0,849	0,030	-0,43
AGENT	$\overline{CAR}$ $t[0,1]$	1	-0,646	0,018	-1,00	-0,220	0,019	-0,47	-0,626	0,017	-1,03	-0,319	0,014	-0,61	-1,020	0,008	**-2,27****	0,614	0,010	1,14	0,999	0,021	0,93
		2	0,118	0,016	0,34	0,096	0,020	0,16	-0,740	0,013	-1,19	-1,075	0,016	-1,26	-0,928	0,019	-1,09	0,664	0,017	**1,29***	-2,478	0,037	-0,72
		3	-3,706	0,030	**-1,90****	-0,703	0,007	-1,12	0,861	0,015	1,14	-0,534	0,011	**-1,48***	-1,537	0,016	**-1,55***	1,188	0,014	**1,31***	-0,891	0,003	n/a
SIZE	$\overline{CAR}$ $t[0,1]$	1	-1,113	0,020	**-1,90****	0,009	0,020	0,02	-0,906	0,017	**-1,44***	-0,618	0,014	-1,01	-0,928	0,016	-1,17	1,065	0,017	**2,18****	-1,136	0,041	-0,36
		0	-0,095	0,016	-0,26	-0,385	0,014	-0,73	0,074	0,010	0,22	-0,738	0,015	**-1,43***	-1,263	0,015	**-2,41*****	0,195	0,007	0,47	-0,625	0,012	-0,65

PANEL B2: DOWNGRADES

Mean comparisons of samples

Variable	Window	Value	FTSE *N*	FTSE ∅-Diff.	FTSE *t*-Test	OMXN *N*	OMXN ∅-Diff.	OMXN *t*-Test	CAC *N*	CAC ∅-Diff.	CAC *t*-Test	DAX *N*	DAX ∅-Diff.	DAX *t*-Test	IBEX *N*	IBEX ∅-Diff.	IBEX *t*-Test	MIB *N*	MIB ∅-Diff.	MIB *t*-Test	AEX *N*	AEX ∅-Diff.	AEX *t*-Test
RCHG	$\overline{CAR}$ $t[0,1]$	1/≥2	205/56	-0,252	-0,22	74/37	-0,074	-0,10	116/24	1,594	**1,49***	49/21	0,441	0,48	24/3	0,206	0,13	36/4	0,719	0,62	39/16	7,516	**1,81****
ISSUER	$\overline{CAR}$ $t[0,1]$	1/2	31/230	-3,724	**-2,64*****	54/57	-1,428	**-2,05****	51/89	0,406	0,48	27/43	0,225	0,26	7/20	0,885	0,76	30/10	1,358	**1,75****	1/54	-4,534	-0,31
AGENT	$\overline{CAR}$ $t[0,1]$	1/2	103/110	-0,764	-1,07	54/50	-0,316	-0,42	49/76	0,115	0,13	30/29	0,756	0,76	7/15	-0,091	-0,07	17/14	-0,049	-0,07	24/30	3,477	0,88
		1/3	103/48	3,060	**1,90****	54/7	0,482	0,36	49/15	-1,486	**-1,28***	30/11	0,214	0,24	7/5	0,518	0,54	17/9	-0,574	-0,58	24/1	1,890	0,38
		2/3	110/48	3,824	**2,82*****	50/7	0,799	0,49	76/15	-1,601	-1,12	29/11	-0,541	-0,38	15/5	0,609	0,38	14/9	-0,524	-0,55	30/1	-1,587	-0,08
SIZE	$\overline{CAR}$ $t[0,1]$	1/0	203/58	-1,018	-0,92	78/33	0,394	0,51	86/54	-0,980	-1,18	42/28	0,120	0,14	16/11	0,335	0,32	26/14	0,871	1,21	33/22	-0,511	-0,13

Panel A1 (Upgrades) and Panel A2 (Downgrades) present mean sample abnormal returns for every country separately. Panel B1 (Upgrades) and Panel B2 (Downgrades) present mean comparisons between samples. The mean values of CAR's and their standard deviations (S.D.) are computed over the 2-day announcement period from day 0 to day 1. Column *N* discloses the number of observations in each variable sample and ∅Diff. denotes the difference between the mean CAR's of the two samples. Calculations of AEX have been excluded for the bank (1) (ISSUER) mean abnormal returns and S.D., since no rating changes for banks occured during the period under review. [a]simple *t*-test statistic, [b]*t*-test for independent samples. ***, **, and * denote significance at 1%, 5% or 10% level, respectively.

A.6. Country-specific cross-sectional analysis

Appendix 6 presents the country-specific average coefficients and t-statistics (in parenthesis) of Upgrade and Downgrade changes from the daily estimation (between 1990 to 2007) of the following cross-sectional regressions:

Model 1: $CAR_i = \alpha_0 + \alpha_1 RCHG_i + \alpha_2 ISSUER_i + \alpha_3 AGENT_i + \alpha_4 SIZE_i + \varepsilon_i$

Model 2: $CAR_i = \alpha_0 + \alpha_1 RCHG_i + \alpha_5 ORT_i + \alpha_6 DM1_i + \alpha_7 DM2_i + \alpha_8 DM3_i + \alpha_9 DM4_i + \alpha_{10} DM5_i + \alpha_{11} DM6_i + \varepsilon_i$

Model 3: $CAR_i = \alpha_0 + \alpha_1 RCHG_i + \alpha_2 ISSUER_i + \alpha_3 AGENT_i + \alpha_4 SIZE_i + \alpha_5 ORT_i + \alpha_6 DM1_i + \alpha_7 DM2_i + \alpha_8 DM3_i + \alpha_9 DM4_i + \alpha_{10} DM5_i + \alpha_{11} DM6_i + \varepsilon_i$

PANEL A: Upgrades

Independent variables	Exp. sign	FTSE Coefficient (*t*-stat.)			OMXN Coefficient (*t*-stat.)			CAC Coefficient (*t*-stat.)			DAX Coefficient (*t*-stat.)			IBEX Coefficient (*t*-stat.)			MIB Coefficient (*t*-stat.)			AEX Coefficient (*t*-stat.)		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
INTERCEPT		0,710	-0,808	-0,022	-0,417	-1,098	-0,465	-0,066	-0,335	-1,007	1,815	6,321	7,625	-0,935	-2,941	-3,169	1,202	2,039	3,744	-8,098	-10,173	-12,100
		(0,45)	(-0,43)	(-0,01)	(-0,25)	(-0,17)	(-0,07)	(-0,05)	(-0,28)	(-0,66)	(0,99)	(1,15)	(1,31)	(-0,63)	(-1,48)	(-1,56)	(1,06)	(1,29)	**(1,87*)**	**(-2,57**)**	**(-2,11**)**	**(-2,34**)**
RCHG	+	-0,208	-0,397	-0,382	-0,087	-0,101	-0,023	0,013	-0,047	0,023	-0,643	-0,623	-0,791	0,847	0,754	0,530	0,235	0,439	0,171	5,385	4,895	5,482
		(-0,31)	(-0,55)	(-0,52)	(-0,11)	(-0,12)	(-0,03)	(0,02)	(-0,08)	(0,04)	(-0,89)	(-0,90)	(-1,05)	(1,11)	(0,89)	(0,62)	(0,43)	(0,76)	(0,29)	**(3,03***)**	**(2,67**)**	**(2,86***)**
ISSUER	+	0,166		0,193	0,789		1,558	-0,361		0,175	0,204		0,574	0,450		1,681	-0,267		-0,258	0,000		0,000
		(0,24)		(0,27)	(1,22)		(1,64)	(-0,75)		(0,26)	(0,34)		(0,84)	(0,50)		**(1,93*)**	(-0,45)		(-0,41)	(n/a)		(n/a)
AGENT	+	-0,611		-0,647	-0,455		-0,483	0,296		0,279	-0,683		-0,785	-0,271		-0,446	-0,595		-0,449	0,658		0,727
		(-1,56)		(-1,62)	(-0,85)		(-0,79)	(0,99)		(0,91)	**(-1,94*)**		**(-2,13**)**	(-0,62)		(-1,07	**(-2,10**)**		(-1,48)	(0,62)		(0,68)
SIZE	+	0,133		0,254	-0,039		-0,209	0,094		0,043	0,465		0,656	-0,409		-0,489	-0,089		0,605	2,407		1,751
		(0,19)		(0,31)	(-0,06)		(-0,29)	(0,21)		(0,09)	(0,86)		(-1,17)	(-0,59)		(-0,76)	(-0,20)		(0,97)	**(1,71*)**		(1,05)
ORT	+		0,417	0,429		-0,001	-0,246		0,147	0,110		-0,428	-0,484		0,899	0,839		-0,416	-0,527		0,511	0,281
			(1,04)	(1,07)		(-0,00)	(-0,55)		(0,50)	(0,36)		(-1,00)	(-1,15)		**(2,41**)**	**(2,28**)**		(-1,41)	(-1,49)		(0,62)	(0,33)
DM1			0,000	0,000		1,088	0,130		0,000	0,000		-3,250	-3,175		0,000	0,000		0,000	0,000		0,000	0,000
			(n/a)	(n/a)		(0,20)	(0,02)		(n/a)	(n/a)		(-0,87)	(-0,86)		(n/a)	(n/a)		(n/a)	(n/a)		(n/a)	(n/a)
DM2			-1,731	-2,047		1,069	0,984		-0,114	-0,082		-2,965	-3,172		-3,470	-3,449		0,088	0,079		1,436	2,230
			(-1,22)	(-1,39)		(0,24)	(0,22)		(-0,12)	(-0,09)		(-1,03)	(-1,12)		**(-2,75***)**	**(-2,67**)**		(0,08)	(0,07)		(0,37)	(0,56)
DM3			-2,674	-3,022		1,175	0,867		-1,560	-1,503		-1,610	-2,082		-7,345	-7,872		0,838	1,156		0,633	1,566
			(-1,11)	(-1,22)		(0,32)	(0,23)		(-0,93)	(-0,88)		(-0,86)	(-1,14)		**(-3,30***)**	**(-3,56***)**		(0,48)	(0,65)		(0,12)	(0,30)
DM4			-3,544	-4,078		0,997	0,850		-1,601	-1,414		0,000	0,000		-9,252	-9,315		0,000	0,000		-1,813	-0,698
			(-0,99)	(-1,12)		(0,30)	(0,25)		(-0,60)	(-0,52)		(n/a)	(n/a)		**(-2,68**)**	**(-2,72**)**		(n/a)	(n/a)		(-0,23)	(-0,09)
DM5			-4,752	-5,295		0,000	0,000		-1,536	-1,218		0,000	0,000		0,000	0,000		0,000	0,000		1,031	2,870
			(-0,91)	(-1,01)		(n/a)	(n/a)		(-0,47)	(-0,37)		(n/a)	(n/a)		(n/a)	(n/a)		(n/a)	(n/a)		(0,11)	(0,29)
DM6			-3,521	-4,137		0,000	0,000		-1,590	-1,309		0,000	0,000		0,000	0,000		0,000	0,000		-4,034	-1,432
			(-0,53)	(-0,61)		(n/a)	(n/a)		(-0,36)	(-0,29)		(n/a)	(n/a)		(n/a)	(n/a)		(n/a)	(n/a)		(-0,34)	(-0,12)
R2 (%)		1,74	2,18	4,04	2,83	0,29	5,06	1,71	5,07	6,23	12,99	5,90	21,90	6,82	33,91	42,79	11,97	10,83	19,59	18,56	26,97	29,76
Adj. R2 (%)		-0,99	-3,38	-3,64	-2,28	-10,50	-9,79	-2,97	-4,36	-7,08	2,75	-17,45	-8,92	-5,21	12,90	14,73	2,70	-9,08	-7,91	10,91	12,06	8,43
F-stat.		0,64	0,45	0,58	0,55	0,04	0,42	0,36	0,62	0,52	1,27	0,41	1,05	0,57	**3,08****	**2,52****	1,29	1,15	1,22	**3,42****	**2,16****	**1,84***
No. of obs.		149	149	149	81	81	81	89	89	89	39	39	39	36	36	36	43	43	43	49	49	49

PANEL B: Downgrades

Independent variables	Exp. sign	FTSE Coefficient (*t*-stat.)			OMXN Coefficient (*t*-stat.)			CAC Coefficient (*t*-stat.)			DAX Coefficient (*t*-stat.)			IBEX Coefficient (*t*-stat.)			MIB Coefficient (*t*-stat.)			AEX Coefficient (*t*-stat.)		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
INTERCEPT		-4,969	-1,699	-4,470	-3,228	-0,532	-2,475	1,955	6,530	28,388	1,224	1,285	1,445	1,741	-0,736	-14,670	2,434	1,403	0,939	10,511	18,408	14,636
		(-1,43)	(-0,62)	(-1,17)	(-1,56)	(-0,30)	(-1,13)	(0,83)	**(2,90***)**	**(2,36**)**	(0,44)	(0,16)	(0,17)	(0,42)	(-0,23)	(-0,90)	(1,05)	(0,45)	(0,12)	(0,34)	(1,65)	(0,45)
RCHG	-	0,126	0,182	0,002	0,198	0,499	0,117	-1,534	-1,765	-1,658	-0,520	-0,434	-0,435	-0,467	-0,674	-1,613	-0,619	-0,693	-0,533	-7,469	-7,109	-6,410
		(0,11)	(0,15)	(0,00)	(0,26)	(0,62)	(0,14)	(-1,39)	**(-1,67*)**	(-1,52)	(-0,52)	(-0,36)	(-0,35)	(-0,23)	(-0,39)	(-0,74)	(-0,53)	(-0,53)	(-0,41)	**(-1,71*)**	(-1,51)	(-1,29)
ISSUER	-	3,811		3,701	1,507		2,221	-0,246		1,262	-0,389		-0,394	-0,908		-0,615	-1,155		-1,277	1,929		3,493
		(2,70*)**		**(2,64**)**	**(2,11**)**		**(2,13**)**	(-0,28)		(1,21)	(-0,42)		(-0,40)	(-0,70)		(-0,42)	(-1,29)		(-1,20)	(0,13)		(0,23)
AGENT	-	-1,230		-1,195	0,100		0,197	0,144		0,247	-0,315		-0,260	-0,423		-0,478	0,116		0,255	-2,886		-2,827
		(-1,95*)		**(-1,87*)**	(0,17)		(0,33)	(0,21)		(0,36)	(-0,51)		(-0,39)	(-0,45)		(-0,49)	(0,26)		(0,47)	(-0,78)		(-0,74)
SIZE	-	-1,334		-1,337	0,593		0,613	-0,874		-0,456	-0,071		-0,058	0,186		1,107	0,371		0,598	-1,766		-1,678
		(-1,21)		(-1,17)	(0,76)		(0,73)	(-0,99)		(-0,51)	(-0,08)		(-0,06)	(0,16)		(0,84)	(0,46)		(0,58)	(-0,44)		(-0,34)
ORT	-		0,348	0,095		-0,098	-0,376		-1,259	-1,351		-0,105	-0,028		0,273	0,614		-0,017	0,103		-2,796	-2,622
			(0,62)	(0,17)		(-0,25)	(-0,91)		**(-2,42**)**	**(-2,56**)**		(-0,21)	(-0,05)		(0,39)	(0,76)		(-0,03)	(0,17)		(-1,23)	(-1,12)
DM1			0,000	0,000		0,000	0,000		0,000	-23,520		-1,265	-0,530		0,000	14,790		0,000	1,145		0,000	0,000
			(n/a)	(n/a)		(n/a)	(n/a)		(n/a)	**(-2,25**)**		(-0,21)	(-0,08)		(n/a)	(1,04)		(n/a)	(0,23)		(n/a)	(n/a)
DM2			-2,064	-1,292		-0,392	-0,467		2,505	-21,387		-0,514	-0,001		-0,928	13,564		0,339	0,288		7,425	8,200
			(-1,02)	(-0,65)		(-0,27)	(-0,32)		**(1,70*)**	**(-2,25**)**		(-0,11)	(-0,00)		(-0,46)	(1,07)		(0,23)	(0,08)		(0,86)	(0,89)
DM3			-1,485	-0,153		1,898	1,340		3,779	-19,992		0,228	0,608		-4,951	8,269		0,337	0,532		3,968	3,830
			(-0,45)	(-0,05)		(0,78)	(0,54)		(1,28)	**(-2,43**)**		(0,05)	(0,13)		(-1,15)	(0,74)		(0,11)	(0,18)		(0,28)	(0,26)
DM4			-5,549	-3,543		-0,691	0,056		9,856	-13,566		-1,433	-1,366		0,000	0,000		-0,427	0,000		27,785	28,191
			(-1,02)	(-0,65)		(-0,18)	(0,01)		**(2,08**)**	**(-1,80*)**		(-0,44)	(-0,41)		(n/a)	(n/a)		(-0,09)	(n/a)		(1,25)	(1,22)
DM5			-4,173	-1,924		7,140	8,386		13,993	-8,906		0,000	0,000		0,000	0,000		0,000	0,000		34,277	33,319
			(-0,53)	(-0,25)		(1,18)	(1,37)		**(1,83*)**	(-1,19)		(n/a)	(n/a)		(n/a)	(n/a)		(n/a)	(n/a)		(1,26)	(1,19)
DM6			7,900	10,712		0,000	0,000		21,540	0,000		0,000	0,000		-8,782	0,000		0,000	0,000		0,000	0,000
			(0,69)	(0,95)		(n/a)	(n/a)		**(2,10**)**	(n/a)		(n/a)	(n/a)		(-0,70)	(n/a)		(n/a)	(n/a)		(n/a)	(n/a)
R2 (%)		4,47	2,37	6,51	4,29	6,89	10,92	2,62	11,00	12,36	0,88	1,84	2,24	3,31	14,02	19,74	9,15	1,69	10,37	7,18	15,88	16,98
Adj. R2 (%)		2,98	-0,72	2,37	0,68	-0,41	1,00	-0,26	5,52	4,79	-5,22	-10,69	-15,76	-14,27	-20,73	-32,60	-1,24	-21,59	-22,43	-0,24	1,19	-4,07
F-stat.		**2,30****	0,88	**1,74***	1,19	1,28	1,38	0,91	**2,33****	**1,82***	0,14	0,20	0,15	0,19	0,69	0,55	0,88	0,12	0,45	0,97	1,51	1,02
No. of obs.		261	261	261	111	111	111	140	140	140	70	70	70	27	27	27	40	40	40	55	55	55

CAR is the cumulative abnormal return over the 2-day announcement period (t_0 to t_{+1}); RCHG is the absolute magnitude of the rating change, where categorical bond ratings are converted into a cardinal variable measured on a 22-point scale (1 for rating AAA, 22 for rating D); ISSUER defines the the industry of the company; AGENT defines the rating agency; and SIZE concludes whether issuer is small or large measured by its market value. ORT captures the effect of original rating before the announcement and; DM1 to DM6 are dummy variables set equal to one, if the original rating is among the given rating category, and zero otherwise. R^2 denotes how much the variables explain from the overall variance of the regression and F-statistic concludes the overall significance of the regression. ***, **, and * denote significance at 1%, 5% or 10% level, respectively.